



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore - 641 107

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EE504 SPECIAL ELECTRICAL MACHINES

III YEAR / Vth SEMESTER EEE

Unit 1 - PMBLDC

By

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Fig. 5.5: Electronic commutator

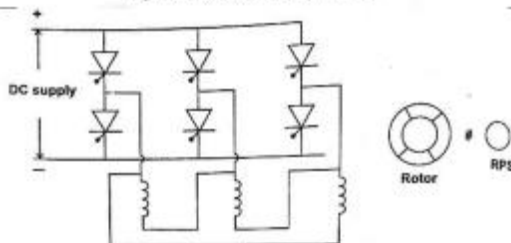


Fig. 5.7: Δ -connected stator armature winding

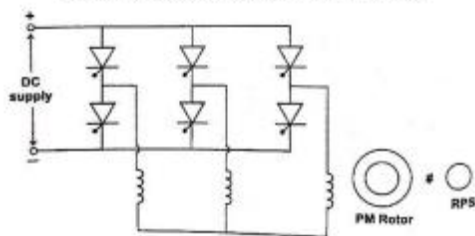
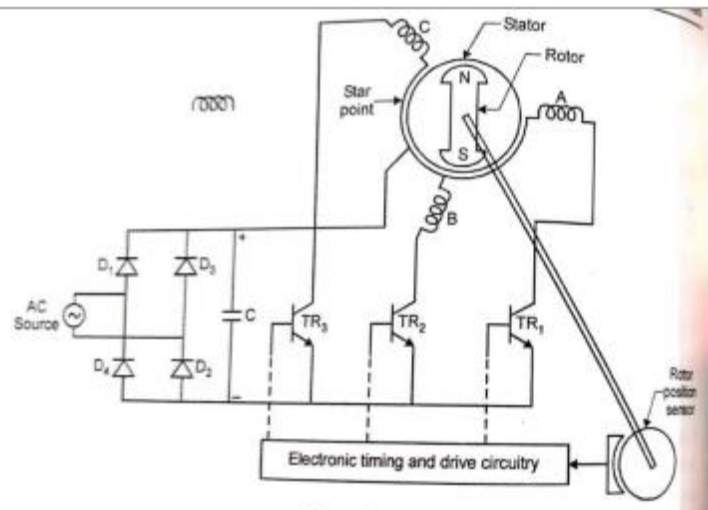


Fig. 5.8: γ -connected armature winding.

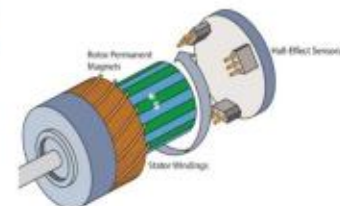


Electronic Commutation in BLDC Motor

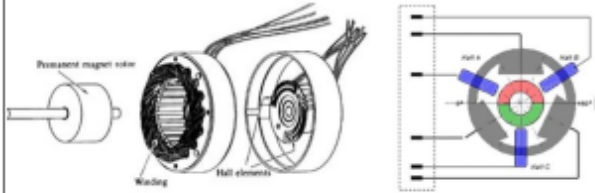
- Torque is produced because of the interaction between the magnetic field generated by the stator coils and the permanent magnets. Ideally, the peak torque occurs when these two fields are at 90° to each other and falls off as the fields move together.
- In order to keep the motor running, the magnetic field produced by the windings should shift position, as the rotor moves to catch up with the stator field. What is known as "Six-Step Commutation" defines the sequence of energizing the windings. See the "Commutation Sequence" section for detailed information and an example on six-step commutation.

Overview

- BLDC Motor- Principle of pole sensing
- Optical sensor
- Hall sensor



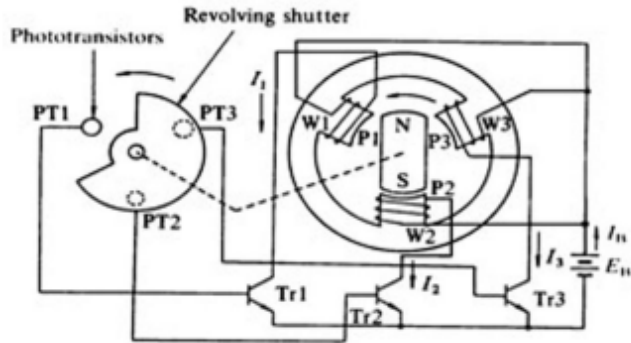
BLDC MOTOR- HALL SENSOR



BLDC MOTOR- HALL SENSOR

- The simple cylindrical 3- ϕ motor is commutated by a Hall effect device for each of the three stator phases.
- The changing position of the permanent magnet rotor is sensed by the Hall device as the polarity of the passing rotor pole changes.
- This Hall signal is amplified so that the stator coils are driven with the proper current. Not shown here, the Hall signals may be processed by combinatorial logic for more efficient drive waveforms.

BLDC MOTOR- OPTICAL SENSOR BASED UNIPOLAR DRIVE



BLDC MOTOR- OPTICAL SENSOR BASED UNIPOLAR DRIVE

- A simple three-phase unipolar-operated motor that uses optical sensors (phototransistors) as position detectors.
- Three phototransistors PT1, PT2, and PT3 are placed on the end-plate at 120° intervals and are exposed to light in sequence through a revolving shutter coupled to the motor shaft.