

**BENHA UNIVERSITY**

**BENHA FACULTY OF ENGINEERING**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Ultimate Guide for Design of VFD**

**Prepared By:**

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Section 1 - Power & Control Engineering

**Subject**Power Electronics (B)

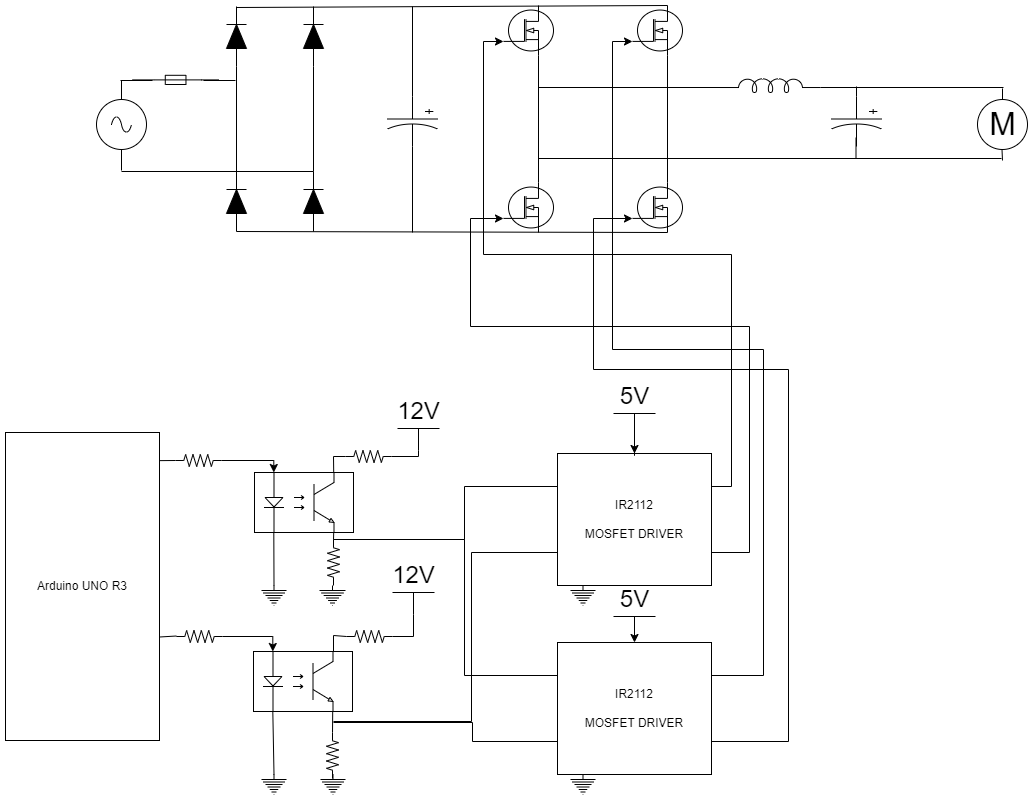
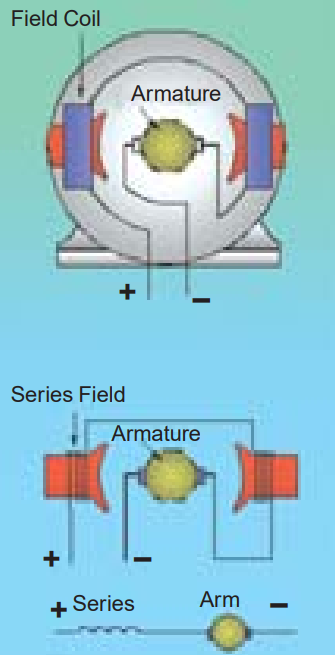
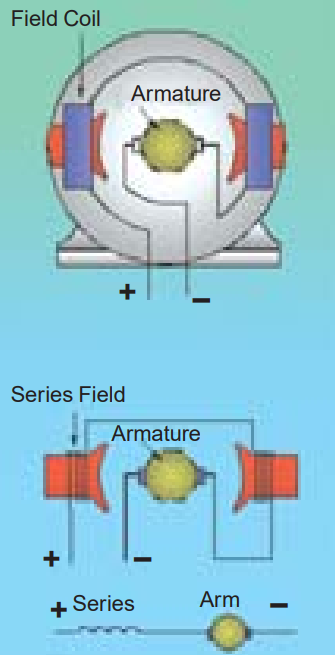
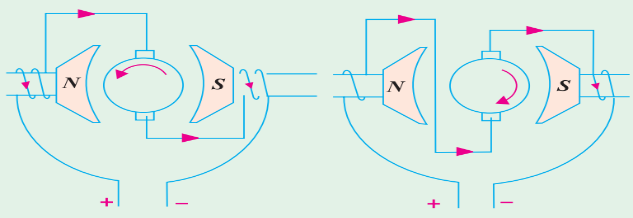
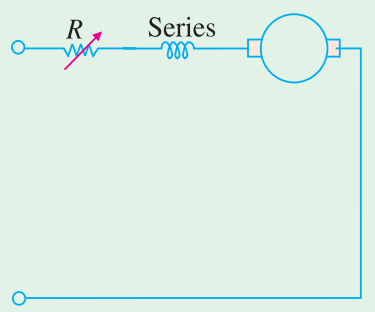
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**Semester:**

3rd Year – 2st Semester

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*  GENERAL DIAGRAM OF SINGLE-PHASE VFD:
*  Data about load (From nameplate and datasheet):
* Type: Evaporator Fan Motor - Universal motor
* Manufacturer: ELCO
* Model: NET2C16PVN002
* Voltage: 230/240 VAC
* Frequency: 50/60Hz
* Power: Maximum output: 16W , Continuous input: 65W
* Current: 0.45A (at full load)
* Speed: 1300 RPM (50Hz) / 1550 RPM (60Hz)
* Service Class: CL/B (Refers to a continuous duty motor with sleeve bearings)
* Operating Temperature Range: -30° to +40°C
* Additional Analysis and Calculations for Motor Parameters:
* Input Apparent power:
* Input Power Factor:

+ Eb,ac -

+

VT

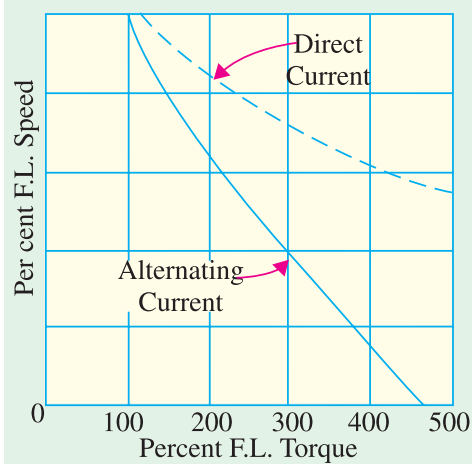
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Ra

Xa

* Total Impedance:

Ia

* Reactive power:
* Motor Reactance:
* Motor Inductance:
* Motor Resistance:
* induced Voltage:
* Developed Torque:
* Source: 220V AC , 50 Hz , THDi & THDv are discussed later.
* Rectifier: Analysis of Bridge Rectifier pre- and post-adding smoothing capacitor.
* Pre-adding smoothing capacitor:
* Post-adding smoothing capacitor:
* For Quick Calculation use:
* Single-Phase Inverter:
* Assumptions: Full H-Bridge , N-MOSFET , Modulation Technique used: Bipolar SPWM,
* Assumptions for design:
* Design:
* Table 8-3 indicates that the normalized voltage harmonic for n = mf and for ma = 1 is 0.6. The voltage amplitude for n = mf is then: