



Examination Answer Books

12 Pages

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Examiner Only

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Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2220588
2	Title of Examination Paper	Power ELECTRONIC DRIVES.
3	Module Code	ACDA 6004
4	Date and Time of Examination	9:30 22-5-26.
5	Examination Venue	310 1Q.
6	Seat Number	12.
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	3 ✓
2	14 ✓
3	14 ✓
4	5 ✓
5	5 ✓
6	2 ✓
7	8 ✓
8	5 ✓
Total	56 %

56 %
PL 1
8/6/26

1). - 7A

- RMF - CAGE - SLIP - LOCK

- RMF 3 coil 120° APART ✓
- Induction speed determined by LOAD.
- ~~Synchronous~~ ^{determined by} frequency ✓
- Synchronous speed determined by frequency ✓
- Induction Squirrel cage induced by voltage
- Squirrel cage forms closed loop circuit.
current flows ✓

2) 250KVA 6KV 12 pole pairs

1000 RPM

P
1 V

$$PI = \frac{P}{V}$$

$$\frac{250}{6} = 41.6A ✓$$

$$P = \underline{I = 41.6A}$$

$$f = \frac{\text{RPM} \times \text{Pole}}{(S)}$$

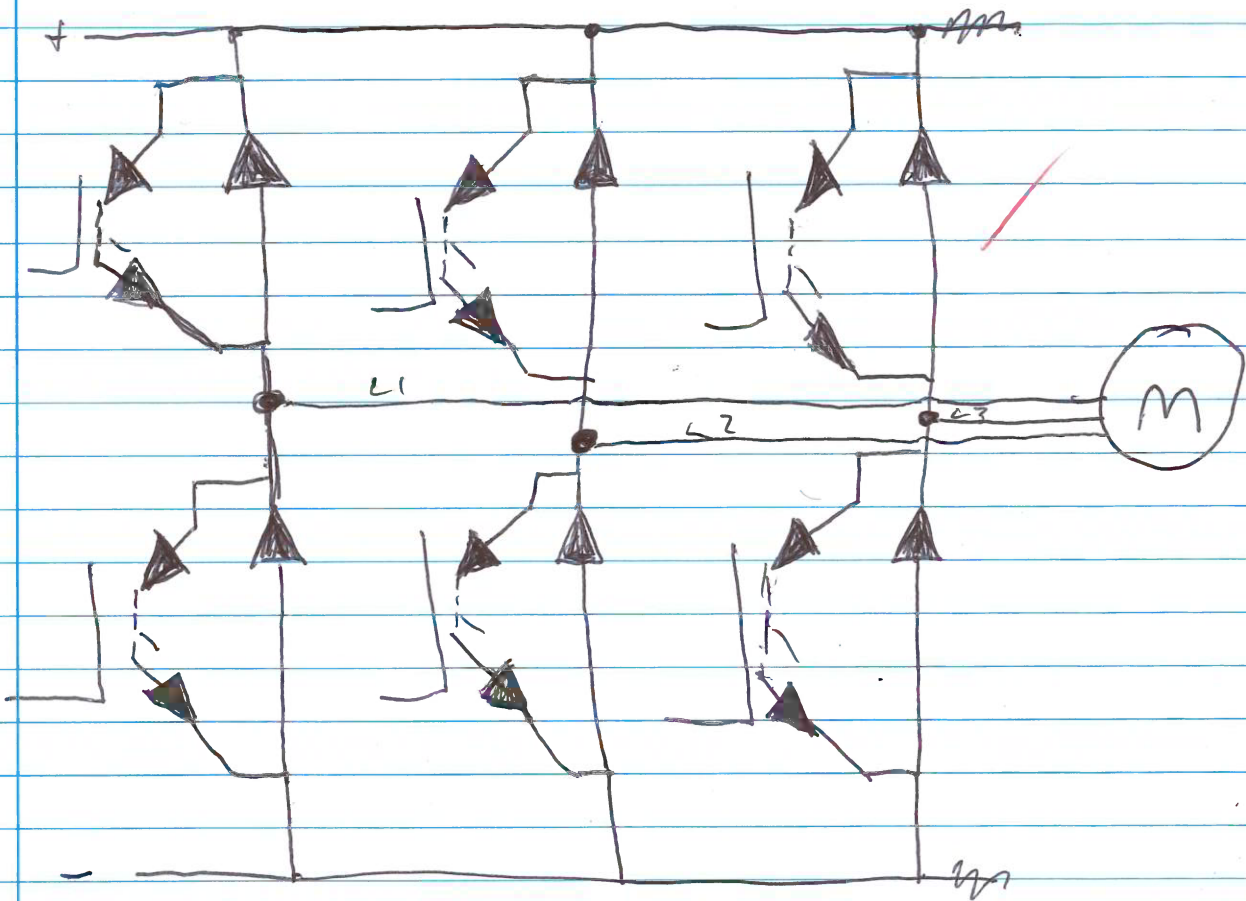
$$f = \frac{1000 \times 12}{60} = 200 \text{ Hz} ✓$$

$$\underline{f = 200 \text{ Hz}}$$

2) High frequency High load. High voltage. ✓

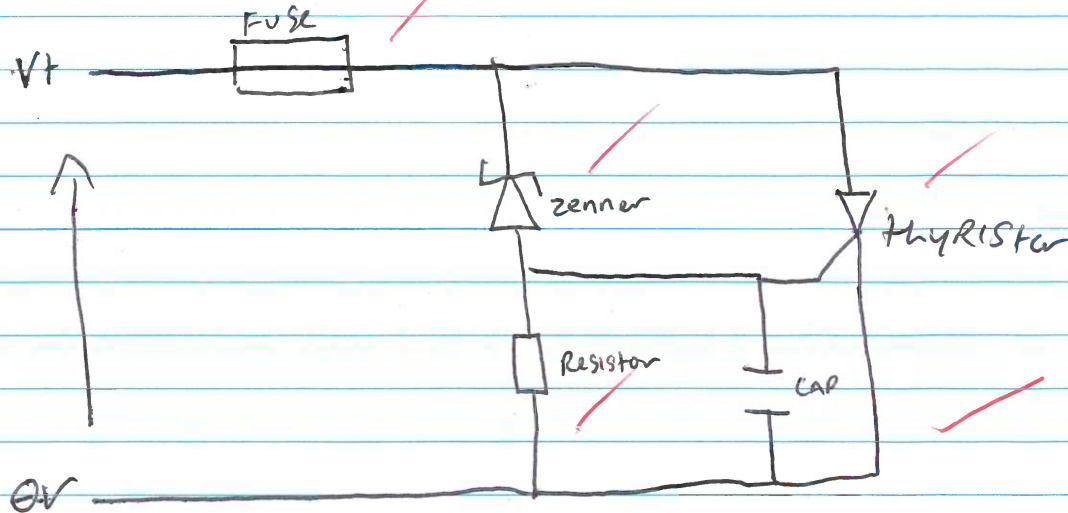
Suggest to use IGBT transistor technology due to the high frequency of 200 Hz , 230 kHz with a voltage of 6 kV , 1000 rpm and 20 pulses per cycle. ✓

the IGBT would be favored over Bipolar + MOSFET despite being a higher cost. the IGBT will handle the current and voltage. ✓



14. ✓

3)



Normal operation the zener diode is not conductive effectively open circuit. Under overvoltage the diode would become conductive. Activating the thyristor via Anode & Cathode, this would then send the higher voltage to fuse blowing cheap component and effectively saving the electronic components in the circuit.

14.

4)

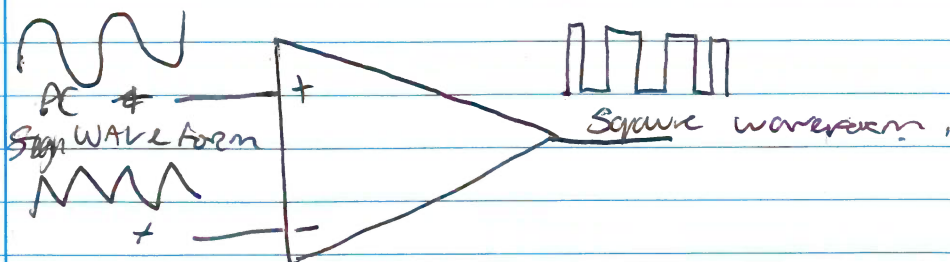
dynamo.

It effectively a mechanical movement to ~~produce~~ generate electricity.

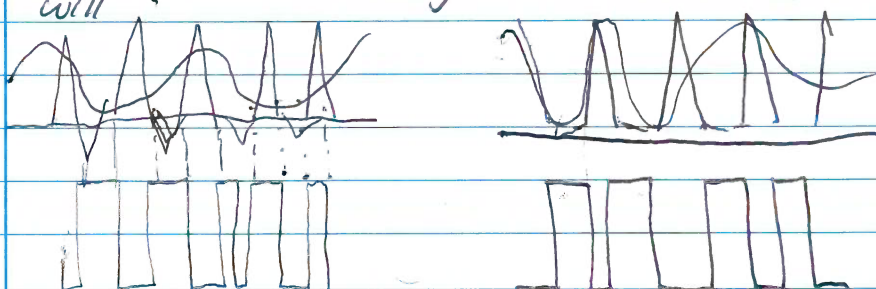
Uses mechanical movement by coils through the magnetic field to generate voltage etc. This is transferred by commutator and brushes to output. Opposite to a motor that uses electricity to mechanical movement.

5

5) PWM



Synchronous motor is Control Speed & torque by Alter adjusting the frequency the waveform will.



6) 6 pole 50 Hz

~~RPM~~

$$\frac{50}{3} = 16.6 \text{ Hz}$$

$$60 \times 16.6 \text{ Hz} = \underline{\underline{1000 \text{ RPM}}}$$

7) 1600 turns 150 mm width 0.75 T flux.
 250 mm depth 3000 rpm.

$$A) \text{ E.m.f} = N \cdot B \cdot A \cdot \omega$$

$$A = \text{Width} \times \text{depth}$$

$$= 150 \times 10^{-3} \times 250 \times 10^{-3}$$

$$A = \underline{0.0375 \text{ m}^2}$$

$$\omega = 2\pi \times f$$

$$f = \frac{3000}{60} = \underline{50}$$

$$\text{E.m.f} = N \times B \times A \times \omega$$

$$= 1600 \times 0.75 \times 0.0375 \times 2\pi \times 50$$

$$= 14137.1 \text{ V}$$

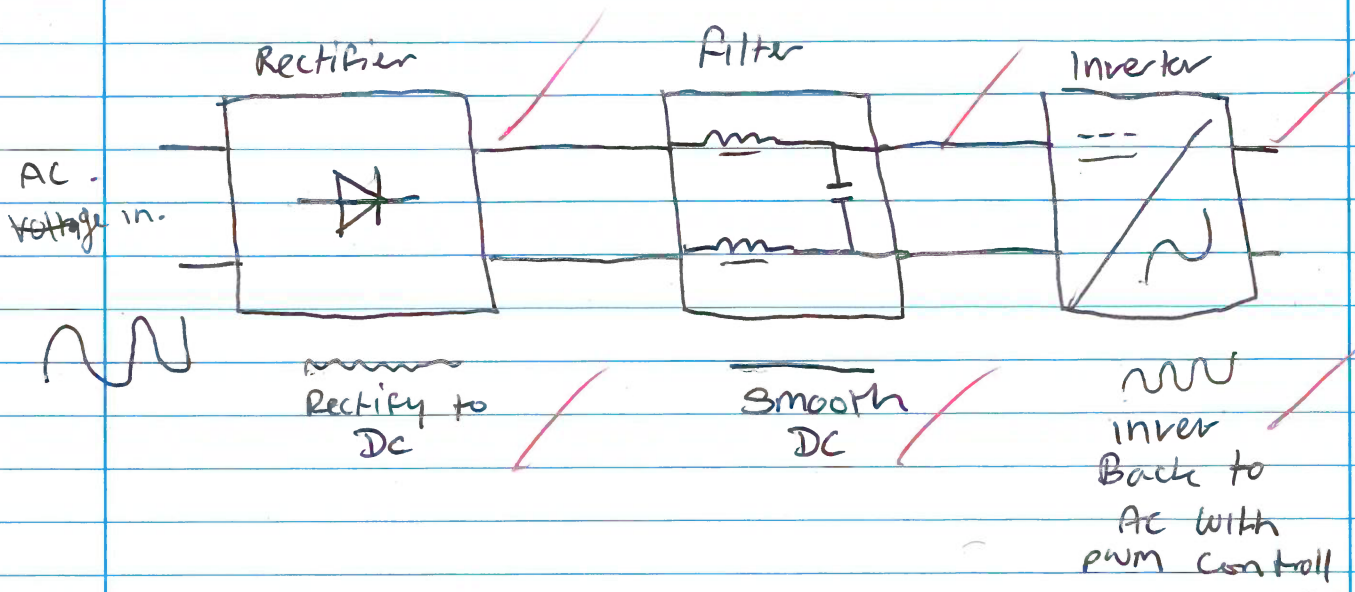
$$B) \phi_{\text{max}} = B \cdot A$$

$$= 0.75 \times 0.0375$$

$$= 0.028125 \text{ wb}$$

$$= 28.5 \text{ mwb}$$

8) a)



Rectifier turns AC input to DC output
 Filter smooth the signal
 Inverter ~~to~~ transform DC back into AC signal.

5



Question No.

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