



Examination Answer Books

12 Pages

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 and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners will ignore illegible script or have it typed and the expense 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	1504731
2	Title of Examination Paper	Powers Electronics and Drivers
3	Module Code	ACDA6004
4	Date and Time of Examination	22/05/2026 09:30 - 11:30
5	Examination Venue	IQ310
6	Seat Number	32
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	1 ✓
2	3 ✓
3	0 ✓
4	0 ✓
5	0 ✓
6	0 ✓
7	2 ✓
8	5 ✓
Total	8 ✓

Q1.

- ~~Three phase synchronous motors use 120°~~
- ~~Three phase induction motors &~~
- A three phase synchronous motor uses 120° angular wave forms.
-

1
✓

Q2.

$$N_s = \frac{120f}{P}$$

Three phase - 250 kVA

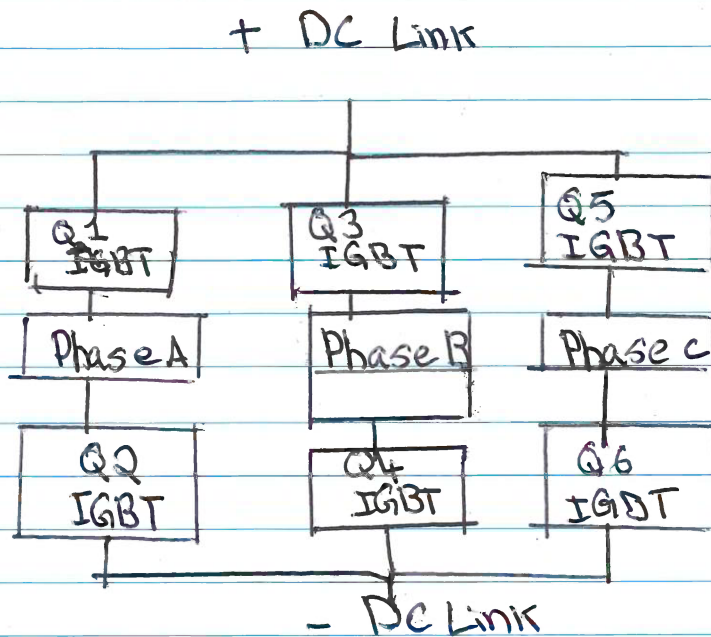
6 kV

12 Poles Pairs (6)

1000 rpm

20 pulse per cycle

IGBT



incorrect
symbols.

$$N_s =$$

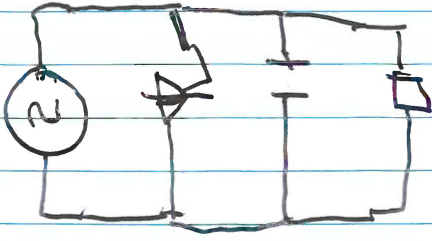
$$120^\circ = \text{Angle}$$

$$f = \text{frequency}$$

$$P = \text{Poles}$$

$$V_{in} =$$





X.

0



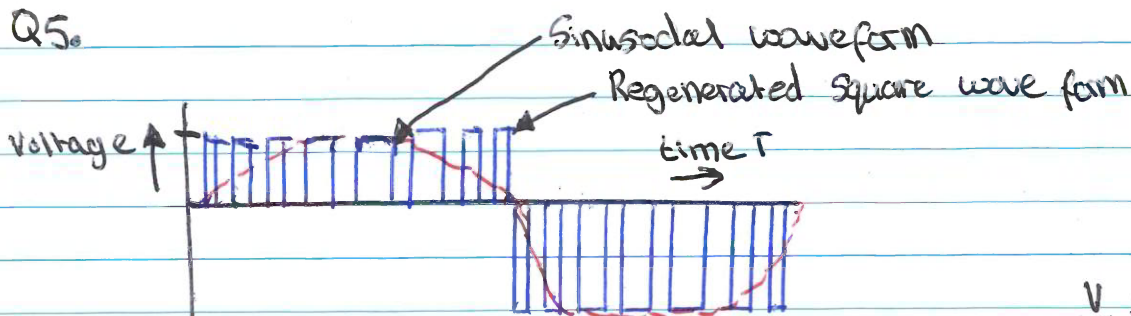
Q4.

0



Q5.

(a)



$$\frac{V}{f} = \text{constant}$$

- (b)
- Increase of frequency to a high, will create low torque.
 - Decrease of frequency to low, will create high torque.
 - Load voltage is used to control speed.
 - Synchronous AC

(a)

Q6. $\frac{6}{50} = 0.12$

6 Poles - 3 pairs

$$\text{rpm} = \frac{50}{60} = 0.83 \text{ r.a.d}^{-1}$$

Q7.

1600

- N

$$I = N$$

150 mm x 250 mm - A

gap = 0.75 T -

$$NI =$$

3000 rpm -

$$N = \frac{I}{A}$$

$$a) \quad \text{Emf}_{\text{max}} = \quad B = \frac{\Phi}{A} =$$

$$\text{Area} = 150 \times 10^{-3} \times 250 \times 10^{-3} = 0.0375 \text{ m}^2$$

$$B = \frac{0.75}{0.0375} = 20 \text{ A/t.}$$

$$\text{Emf}_{\text{max}} = \quad NBAC\omega \quad / \quad = \quad \omega = 2\pi f$$

$$1600 \times 20 \times 0.0375 \times 2 \times \pi$$

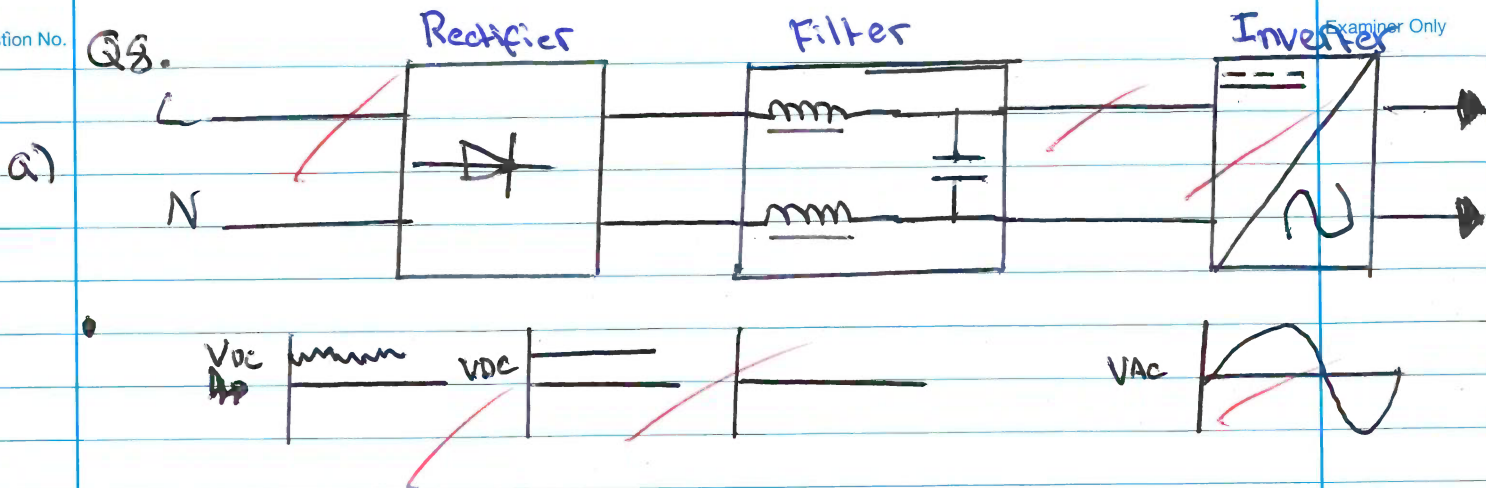
$$\text{EMF}_{\text{max}} =$$

$$b) \quad \frac{0.75 \times 250 \times 10^{-3}}{1600} = 1.179 \times 10^{-4}$$

$$F = BIL$$

$$\frac{0.75 \times 0.0375}{3000} = 9.375 \times 10^{-6}$$

$$\Phi = 9.375 \text{ wb}$$



- A DC wave form ~~is~~ goes through the rectifier
- The wave form is flatend out
- Filter converts to AC using inductors and capacitors
- Inverter turns wave form into Sinusoidal AC waveform.

- b)
- ~~For~~ Increase frequency to ~~increase~~ accelerate torque X
 - Decrease frequency to decelerate torque X
 - Voltage and current input control



Question No.

Examiner Only

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Rhif y Cwestiwn

