



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 over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners cannot read 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	2218001
2	Title of Examination Paper	POWERS ELECTRONICS B DRIVES
3	Module Code	ACDA 6004
4	Date and Time of Examination	22/05/26 9:30am
5	Examination Venue	SWANSEA
6	Seat Number	14
7	Number of Answer Books handed in	

Con
(see

SUR

FOR

Examiner Only

List the numbers of the questions you have attempted	Office Use
1	4
2	7
3	12
4	0
5	10
6	2
7	8
8	9
Total	52%

RMF.

① Squirrel Cage

- THREE POLES, 120°
- RMf
SQUIRREL CAGE $\rightarrow$ RMf.
- ~~RMf creates squirrel~~
- SQUIRREL CAGE CREATES CIRCUIT.
- SPEED DEPENDANT ON ^{SUPPLY} LOAD.

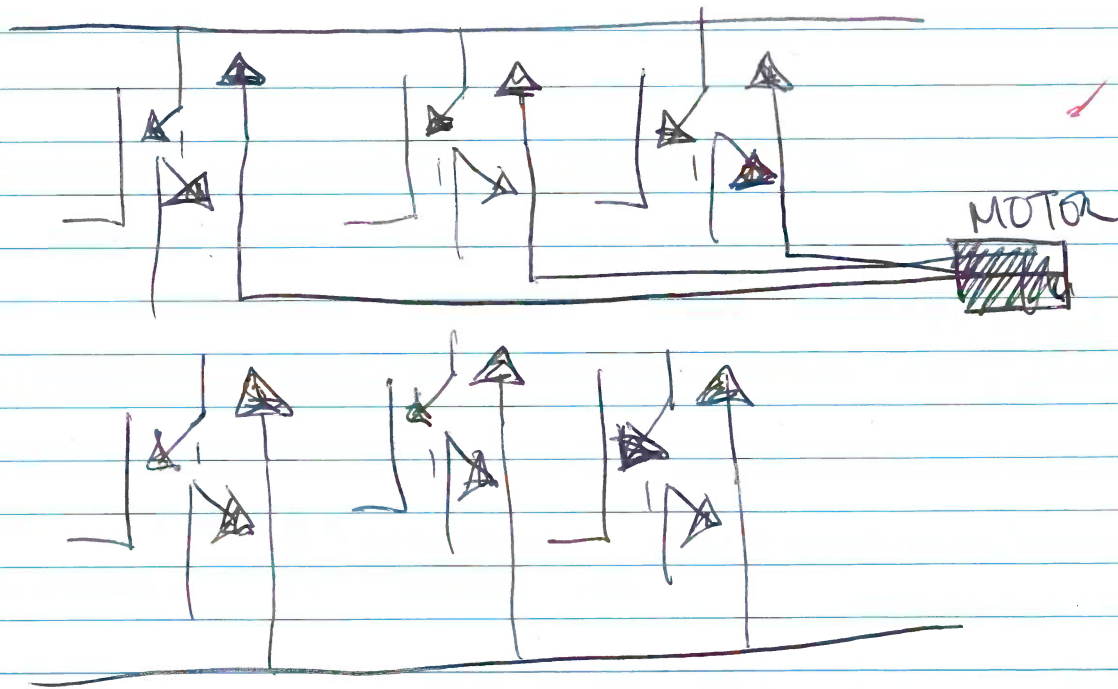
4.

$$\frac{250000}{6000} = 41.666666667 \checkmark$$

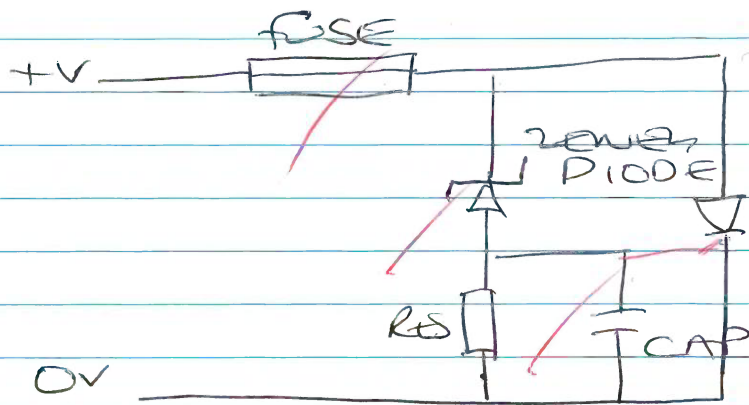
$$\frac{3000}{60} = 50 \text{ Hz} \checkmark$$

$$\frac{1000 \times 12}{60} = 200 \checkmark$$

THIS USES 20 PULSES PER CYCLE.



3



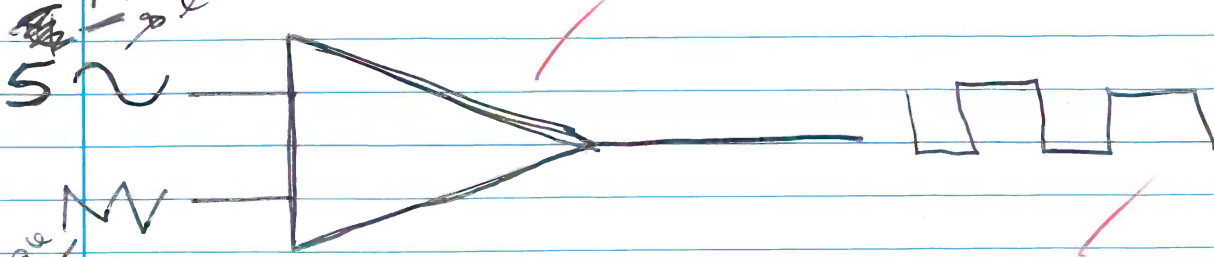
- NORMAL CONDITIONS ZENER DIODE DOESN'T COME ON ^{effectively} OPEN CIRCUIT BETWEEN ANODE & CATHODE
- MAX VALUE CAUSES ZENER TO BLOW FUSE, PROTECTING SUPPLY

12

Rotor

- 4 Rotor creates magnetic field. magnetic field cuts stator. X

A square wave form encoded.



Triangle wave form.

~~DECODE~~ PWM. HAS AN INPUT OF A SIGN WAVE & TRIANGLE WAVE. OUTPUTS A SQUARE WAVE FORM



WHEN THE TRIANGLE WAVE FORM IS ABOVE/HIGH ON THE SIGN WAVE, IT WILL GIVE A LOW OUTPUT, HOWEVER WHEN IT IS BELOW/LOW THE SIGN WAVE IT WILL GENERATE A HIGH OUTPUT.

CONTROLLING ~~the~~ TORQUE & SPEED ON A MOTOR CAN BE DON BY ~~just~~ ALTERING THE SIGN WAVE & TRIANGLE WAVEFORM INPUTTED INTO THE PWM ENCODER, THIS WILL EFFECT WHAT OUTPUT IS GENERATED!

b

6 pole = 3 pair poles

$$\frac{50}{3} = 16.66666667$$

$$16.66666667 \times 60 = 1000 \text{rpm.}$$

2

7

A

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

$$emf_{max} = 0.0375$$

$$\frac{3000}{60} = 50 \text{ Hz}$$

$$1600 \times 0.75 \times 0.0375 \times \frac{2 \times \pi \times 50}{60} = 14137.16694 \text{ V}$$

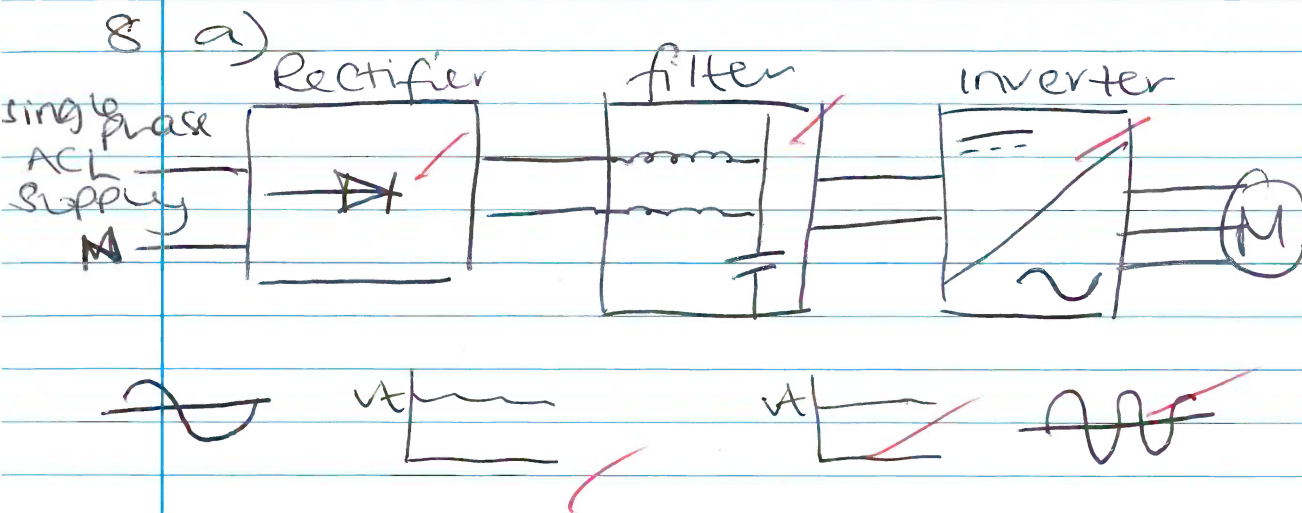
4.

B max flux cutting coil 90°

$$0.75 \times 0.0375 = 0.028125 \text{ wb}$$

4.

(8)



- RECTIFIER CONVERTS AC TO DC
- FILTER SMOOTHS RECTIFIED DC
- INVERTER CONVERTS SMOOTHED & RECTIFIED DC BACK TO AC AT A FREQUENCY FOR MOTOR. + TORQUE

B ACCELERATION/DECELERATION OF A MOTOR CAN BE CONTROLLED BY FREQUENCY & TORQUE

ACCELERATION = INCREASE / DECREASE FREQUENCY

TORQUE = INCREASE / DECREASE VOLTAGE /

4.

(9)



Examiner Only

Question No.



Rhif y Cwestiwn

Arholwr yn unig