OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

Cambridge TECHNICALS 2016

ENGINEERING

Combined feedback on the June 2017 exam paper (including selected exemplar candidate answers and commentary)

Unit 4 – Principles of electrical and electronic engineering

Version 1

CONTENTS

INTRODUCTION

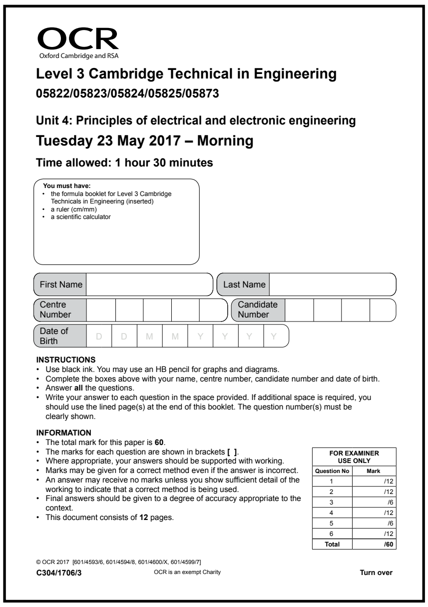
TThis resource brings together the questions from the June 2017 examined unit (Unit 4), the marking guidance, the examiners comments and the exemplar answers into one place for easy reference.

We have also included exemplar candidate answers with commentary for Questions 1a, 1b, 1c (ii), Q4a and Q4b.

The marking guidance and the examiner's comments are taken from the Report to Centre for this question paper.

The Question Paper, Mark Scheme and the Report to Centre are available from:

https://interchange.ocr.org.uk/Modules/PastPapers/Pages/PastPapers.aspx?menuindex=97&menuid=250



OCR
Oxford Cambridge and RSA

Level 3 Cambridge Technical in Engineering
05822/05823/05824/05825/05873

Unit 4: Principles of electrical and electronic engineering
Tuesday 23 May 2017 – Morning
Time allowed: 1 hour 30 minutes

You must have:
- the formula booklet for Level 3 Cambridge Technicals in Engineering (inserted)
- a ruler (cm/mm)
- a scientific calculator

First Name | Last Name
Centre Number | Candidate Number
Date of Birth D D M M Y Y Y Y

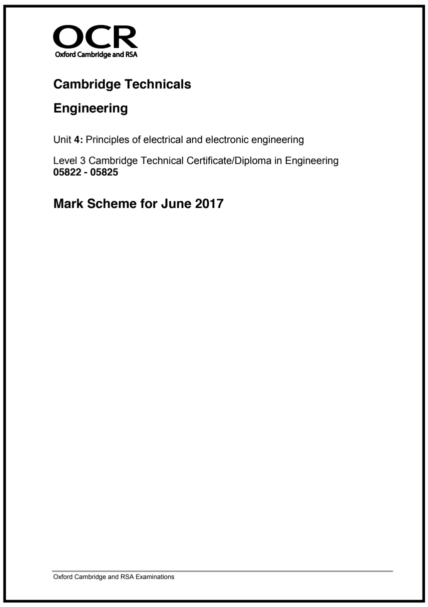
INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number, candidate number and date of birth.
- Answer **all** the questions.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [ ].
- Where appropriate, your answers should be supported with working.
- Marks may be given for a correct method even if the answer is incorrect.
- An answer may receive no marks unless you show sufficient detail of the working to indicate that a correct method is being used.
- Final answers should be given to a degree of accuracy appropriate to the context.
- This document consists of **12** pages.

FOR EXAMINER USE ONLY

Question No	Mark
1	/12
2	/12
3	/6
4	/12
5	/6
6	/12
Total	/60

© OCR 2017 [601/4593/6, 601/4594/8, 601/4600/X, 601/4599/7]
C304/1706/3 OCR is an exempt Charity Turn over



OCR
Oxford Cambridge and RSA

Cambridge Technicals

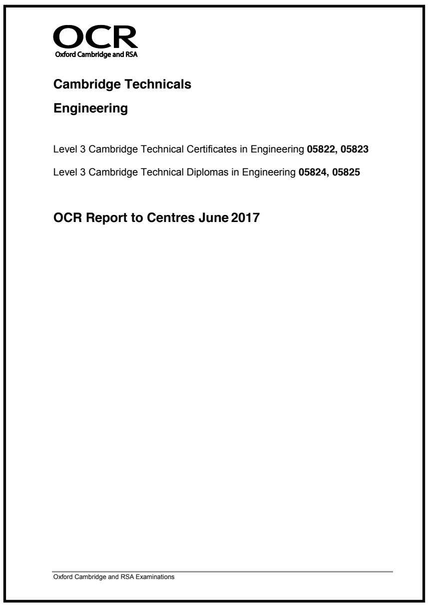
Engineering

Unit 4: Principles of electrical and electronic engineering

Level 3 Cambridge Technical Certificate/Diploma in Engineering
05822 - 05825

Mark Scheme for June 2017

Oxford Cambridge and RSA Examinations



OCR
Oxford Cambridge and RSA

Cambridge Technicals

Engineering

Level 3 Cambridge Technical Certificates in Engineering 05822, 05823

Level 3 Cambridge Technical Diplomas in Engineering 05824, 05825

OCR Report to Centres June 2017

Oxford Cambridge and RSA Examinations

GENERAL EXAMINER COMMENTS ON THE PAPER

Questions on the use of the fundamentals (questions1, 2 and 6) were generally answered well. Questions on systems (3, 4 and 5), with a greater reliance on understanding, explanation and recall were not answered so well.

There was widespread misuse of the key words current, charge, voltage, power, phase, indicating a less than certain grip on the nature of electricity. It would seem that more time spent early on to embed these ideas would lead to more successful outcomes.

There were a number of missing or incorrect units being used for numerical answers.

A large number of learners were able to correctly substitute values into the appropriate formulas but then calculated the incorrect answer. Usually these candidates were not applying the BODMAS rules when using their calculators.

Resources which might help address the examiner comments:

From the link below, you'll find 'The OCR guide to examinations' (along with many other skills guides)
http://www.ocr.org.uk/i-want-to/skills-guides/

Command verbs definitions
http://www.ocr.org.uk/Images/273311-command-verbs-definitions.pdf

Question 1(a)

Answer **all** the questions.

1 Fig.1 shows a five resistor network.

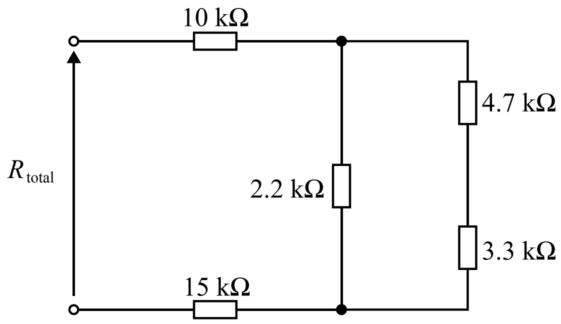


Fig.1

(a) Calculate the total resistance R_{total}.

Use

$$\frac{1}{R_{total}} = \frac{1}{R^1} + \frac{1}{R_2} \text{ and } R_{total} = R_1 + R_2$$

R =4.7kΩ + 3.3kΩ = 8 kΩ
1/R = 1/8kΩ + 1/2.2kΩ, R = 1.73kΩ
R_{total} = 10kΩ + 1.73kΩ + 15kΩ
R_{total} = 26.7kΩ

[4]

Questions 1(b) and (c)

(b) Fig. 2 shows a circuit with two fixed resistors.

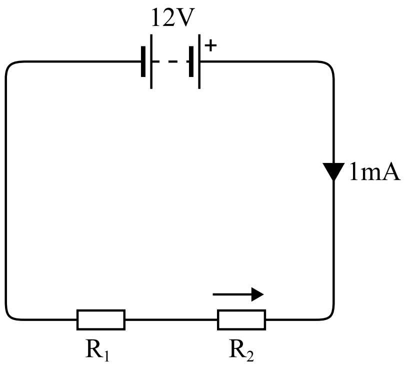


Fig. 2

Calculate V_2, the voltage drop across R_2, when $R_1 = 4.7\,k\Omega$.

Using V = IR
Voltage drop across R_1 (V_1) = $1 \times 10^{-3} \times 4.7 \times 10^{3} = 4.7V$
Using Kirchoff's Voltage law:
$V_{Supply} = V_1 + V_2$, $V_2 = 12V - 4.7V$
$V_2 = 7.3V$

[4]

(c) A DC supply has an internal resistance of 3 Ω and an open circuit voltage of 24 V.

(i) State the value of the load that will enable maximum power transfer.

3Ω

[1]

(ii) Calculate the power dissipated in the load.

Use $R_t = R_1 + R_2$, I = V/R, $P = I^2R$
R_t = 3Ω+ 3Ω = 6Ω
I = 24V/6Ω = 4A
P = 42.3 = 48(W)
Or
Use $R_t = R_1 + R_2$, I = V/R, P = VI
V across R_{Load} = V/2 =12V (1)
I = 24V/6Ω = 4A (1)
P = 12.4 = 48(W) (1)

[3]

Mark scheme guidance

Question 1(a):

(For applying knowledge from Unit 2, LO3)

(For applying knowledge from Unit 2, LO3)

Allow ECF.

Award 1 mark for correct numerical result with unit, with or without rounding.

Question 1(b):

(For applying knowledge from Unit 2, LO3)

Award 1 mark for correct numerical result with unit.

Award 1 mark for correct numerical result with unit.

Question 1(c)(i):

Award 1 mark for correct numerical result with unit.

Question 1(c)(ii):

(For applying knowledge from Unit 2, LO3)

Allow ECF if 3Ω.

(For applying knowledge from Unit 2, LO3)

Award 1 mark for correct numerical result with or without unit.

Award a maximum of 1 mark for $24^2/6$ or $24^2/3$.

Examiners comments

Question 1(a) – Was a searching question on resistor combination that was usually handled competently provided time was taken to plan the three phases of the calculation. Most candidates recognised the need to use both formulae as appropriate.

Question 1(b) – Was also handled successfully provided all the data was used correctly.

Question 1(c)(i) – Required recall and few candidates got it right.

Question 1(c)(ii) – There appeared to be widespread misunderstanding of the term 'load' in the context of the question.

Exemplar Candidate Work

Question 1(a) – low level answer

1 Fig.1 shows a five resistor network.

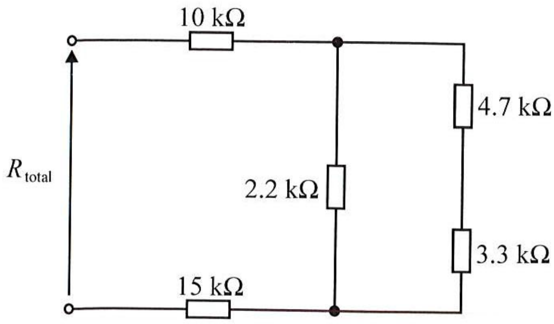


Fig.1

(a) Calculate the total resistance R_{total}.

10+15 = 25 4.7 + 3.3 = 8

$\frac{1}{R_1} + \frac{1}{R2} = R$

$\frac{1}{2.2} + \frac{1}{8} = 0.579$

25+0.579 = 25.579 Ω

[4]

Commentary

To find the total resistance of the network it is necessary to execute the correct sequence of combinations:

1. Combine the series resistors 4.7kΩ + 3.3kΩ
2. Combine this with the parallel leg 2.2 kΩ
3. Combine the resistance of this sub-network with the two resistances in series with it
4. State the correct total resistance to at least 2 significant figures and with the correct unit.

This candidate only completed step 1. To move to a medium level answer required the use of the above sequence, and correct choice of series or parallel formula, although the latter was the lesser problem in the majority of cases.

Exemplar Candidate Work

Question 1(a) – high level answer

1 Fig.1 shows a five resistor network.

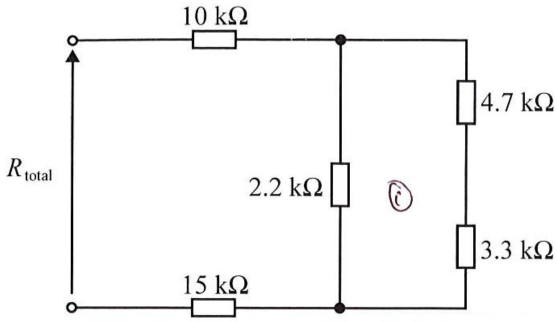


Fig.1

(a) Calculate the total resistance R_{total}.

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$

$\frac{1}{R_T} = \frac{1}{2.2} + \frac{1}{4.7+3.3}$

$\frac{1}{R_T} = \frac{1}{2.2} + \frac{1}{8}$

$\frac{R_T}{1} = \frac{2.2}{1} + \frac{8}{1}$

$R_T = 10.2 k\Omega$

$10.2 + 15 + 10$

$R_{total} = 35.2 k\Omega$

[4]

Commentary

High level answers invariably demonstrated confident use of the combination rules and the formulae for series and parallel networks but might falter with the algebra, as in this case, or in assignment of units or powers of ten. This candidate was successfully tackling the first two combination steps but lost marks on addition of fractions.

Exemplar Candidate Work

Question 1(b) – low level answer

(b) Fig. 2 shows a circuit with two fixed resistors.

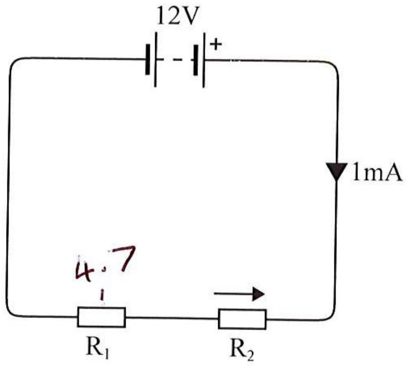


Fig. 2

Calculate V_2, the voltage drop across R_2, when R_1 = 4.7 kΩ.

~~12 ÷ 4.7 = 2.6Ω~~ 12V – 4.1 Ω = 7.9V

Voltage drop = 4.7V

[4]

Commentary

In a medium level response we should expect to see use of the given data and Ohm's law to find the potential difference across R_1 or alternatively, the use of Kirchoff's voltage law to determine V_2 as the difference between ε and V_1. The candidate will also record steps in the calculation so that the answer is achieved from the working and not just by writing down the answer. In this example, the workings are incorrect therefore do not lead to the answer, but the correct value for V_1, with its unit, is stated.

Exemplar Candidate Work

Question 1(b) – high level answer

(b) Fig. 2 shows a circuit with two fixed resistors.

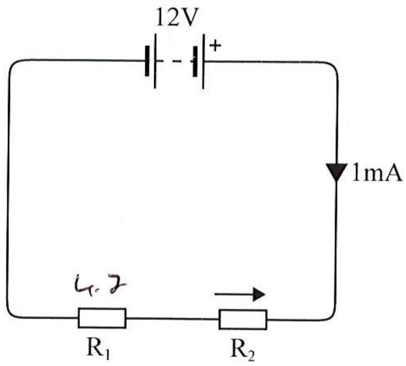


Fig. 2

Calculate V_2, the voltage drop across R_2, when $R_1 = 4.7\,k\Omega$.

V = I R   R = V / I   R_T = 12 kΩ

12 − 4.7 = 7.3   V_2 = I × R_2

V_2 = 7.3

[4]

Commentary

Ohm's law is used to find V_1 the correct value for voltage drop across R_1, This coupled with correct use of Kirchoff to find the voltage drop across R_2 is necessary to award this a high level response. Accurate workings, use of correct units and powers of ten are all necessary to achieve full marks.

Exemplar Candidate Work

Question 1(c)(ii) – low level answer

(ii) Calculate the power dissipated in the load.

P = V²R

P = 12 x 1mA

P = 12 x 1 x10⁻³ **[3]**

P = 0.012

Commentary

Without knowledge of the correct answer to 1c(i) there are two unknowns, the value of the load and hence the terminal voltage. Candidates who made some reasonable assumptions about the unknowns to find the answer using the formula $P = V^2/R$ were considered to have given a low level answer.

Question 1(c)(ii) – high level answer

(ii) Calculate the power dissipated in the load.

I = E / 2r   24 / 6 = 4 A

P = I²R   4² x 3 = 48 W

[3]

Commentary

A high level answer was dependent on a recognition that maximum power is transferred when $R_i = R_L$. This might lead to calculation of I using Ohm's law or V_L using Kirchoff's voltage law. Either way, correct application of the appropriate version of the power formula would lead to the correct answer. Candidates who could not recall $R_i = R_L$ for maximum power transfer were not able to access the higher marks. A high level answer also required correct application of the power formula using values obtained for either I or V_L. For full marks the workings had then to be shown to lead to the correct answer. The unit (w) could be omitted and incorrect units were ignored in this case.

Question 2(a)

2 Fig. 3 shows an AC circuit with a 70 Ω resistor, 33 μF capacitor and 0.5H inductor connected in series with a 240V, 50Hz supply.

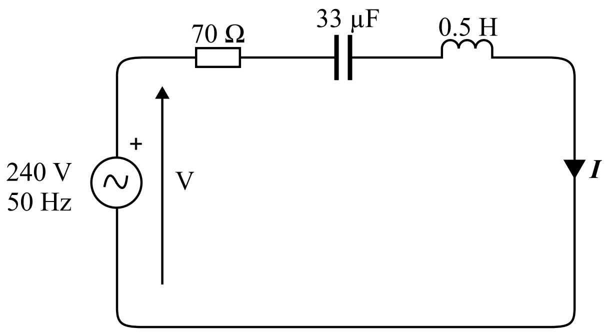


Fig. 3

(a) **(i)** Calculate the phase angle ϕ.

$$X_C = \frac{1}{2\pi f c}$$

$$X_C = \frac{1}{2 \times \pi \times 50 \times 33 \times 10^{-6}}$$

$X_C = 96.5(\Omega)$
$X_L = 2\pi fL$
$X_L = 2 \times \pi \times 50 \times 0.5$
$X_L = 157(\Omega)$

$$Z = \sqrt{R^2 + (X_L - X_c)^2}$$
$$Z = \sqrt{70^2 + (157 - 96.5)^2}$$
$Z = 92.5(\Omega)$

Cos ϕ = R/Z
Cos ϕ = 70/92.5

Phase angle (ϕ) = 40.8°

. **[4]**

(ii) Calculate ***I***.

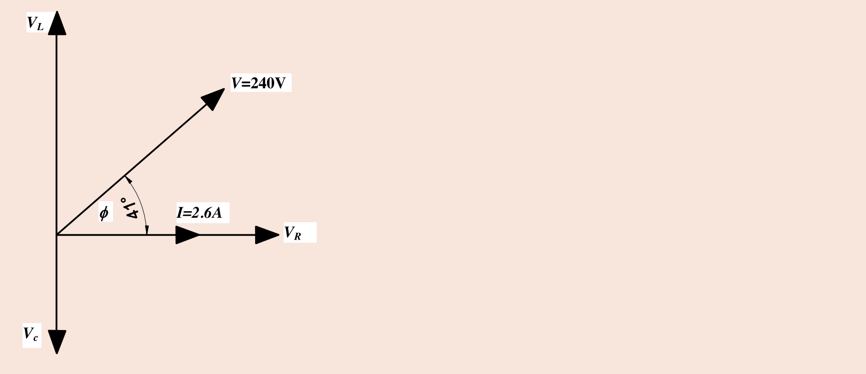
I= V/Z = 240V/92.5Ω = 2.6A

. **[1]**

Questions 2(a)(iii) and (b)

(iii) Draw a phasor diagram to represent the circuit shown in Fig. 3.

Show the **values** of V, I and the phase angle $\varnothing$ clearly on this diagram.



[3]

(b) The instantaneous value of a voltage waveform is represented by $v = 25\sin 628.3t$.

(i) Calculate the frequency of the waveform.

2πf = 628.3
f = 628.3/2π = 100Hz

[2]

(ii) Calculate the periodic time.

f = 1/t
t = 1/100 = 0.01seconds

[2]

Mark scheme guidance

Question 2(a)(i):

Award 1 mark for correct numerical result 96.46 / 96.154 / 96 / 96.5 / 96.2 with or without unit.

Award 1 mark for correct numerical result 157.1 / 157 / 160 with or without unit.

Award 1 mark for correct numerical result 92.6 / 92.5 / 94 / 93 with or without unit.

Allow ECF. Correct answer 40.9˚ / 40.8˚ / 41˚.

(For applying knowledge from Unit 2, LO3)

Unit must be included, degrees or radians equivalent.

Question 2(a)(ii):

Allow ECF. Correct answer 240/Z to at least 2 significant figures.

Unit must be included.

Question 2(a)(iii):

Award one mark for correct positioning of V_L, V_C and V_R.

Award 1 mark for correct positioning of *V* with correct phase angle and value.

Units must be included. Allow ECF.

Award 1 mark for correct positioning of ***I*** with value. Units must be included. Allow ECF.

Question 2(b)(i):

Award 2 marks for correct numerical result with unit.

Question 2(b)(ii):

Award 2 marks for correct numerical result with unit.

Examiners comments

Question 2(a)(i) – Those candidates who understood to differentiate *R, C, L, X, Z* were usually successful.

Question 2 (a)(ii) – Very few used the correct formula I = V/Z.

Question 2 (a)(iii) – Was not well answered and very few candidates were able to construct all elements of the phasor diagram.

Question 2(b) – Recognition of the AC voltage waveform formula usually led to a good score in both parts.

Question 3

3 Fig. 4 shows the circuit diagram for a shunt wound DC motor.

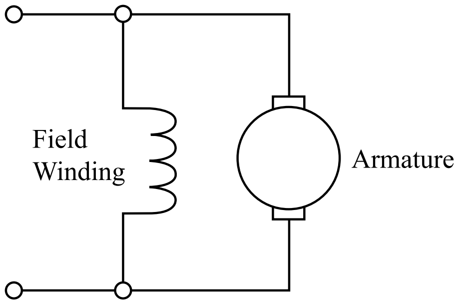
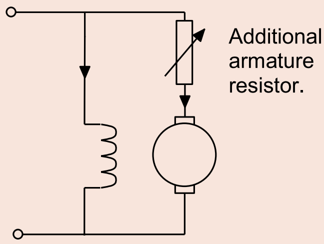


Fig. 4

(a) Explain with the aid of circuit diagrams **two** methods of controlling the speed of a shunt wound DC motor.

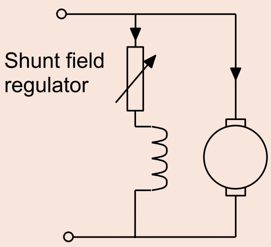
Method 1



Speed can be controlled by varying the current flow through the armature.

Increasing the resistance of the armature circuit will decrease the current flow in the armature and decrease the speed of the motor.

Method 2



Speed can be controlled by varying the value of flux using a variable resistor in series with the field winding (shunt field regulator).

As resistance of shunt field regulator increases the value of field current decreases, value of flux decreases and the speed increases.

[6]

Mark scheme guidance

Question 3:

Diagram or allow adequate description.

Purpose of the change.

Explanation of the outcome.

Diagram or allow adequate description.

Purpose of the change.

Also award 1 mark here if explained using formula $n \propto 1/\Phi$ where n = motor speed, Φ = flux.

Explanation of the outcome.

Allow suitable alternative answers.

Examiners comments

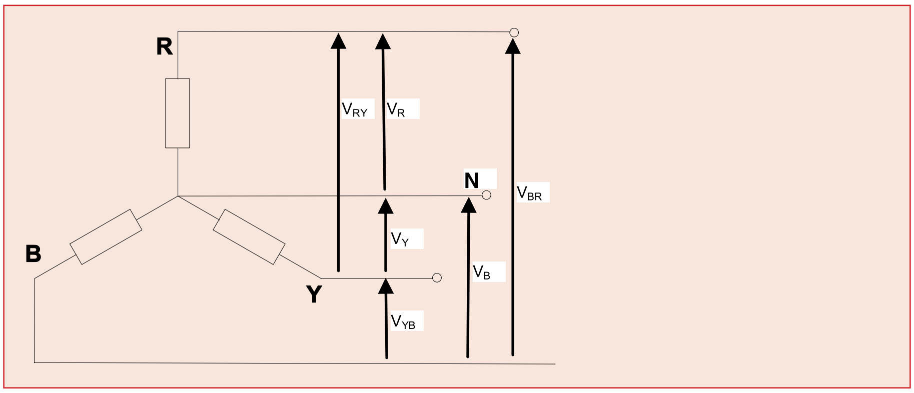
Question 3 – Most candidates were unable to recall any of the methods of controlling speed. Of those who did very few were able to put together a coherent explanation to gain full marks.

Questions 4(a) and (b)

4 A star connected three phase four wire network is widely used as a system of three phase electricity supply in the UK.

(a) Draw a circuit diagram that shows how this network is connected.

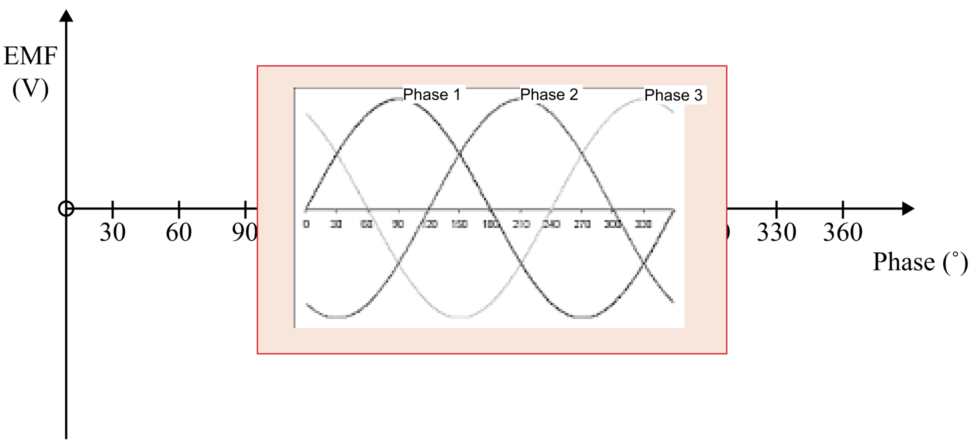
Indicate the phase voltages and the line voltages on the diagram.



[4]

(b) Sketch the waveforms which show one voltage cycle of a three phase supply.

Label phase 1, phase 2 and phase 3 on the sketch.



[4]

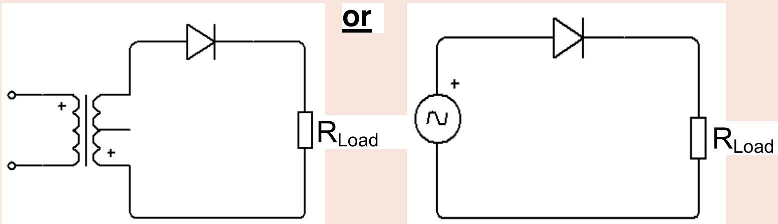
Questions 4(c) and (d)

(c) State the typical voltage of a three phase supply in the UK.

415V

. **[1]**

(d) Explain with the aid of a circuit diagram how half wave rectification of an AC waveform can be achieved by using a single diode.



- Diode is forward biased/conducting for first half (positive) of the AC input waveform. A half waveform (positive) of current will therefore flow through the load.
- Diode is reverse biased/not conducting for the second half (negative) of the AC input waveform. No output signal for this half if the waveform as no current flow.

....

....

....

.... **[3]**

Mark scheme guidance

Question 4(a):

Resistors drawn in star formation.

Neutral Line.

Line voltages correctly labelled V_{BR}, V_{RY}, V_{YB}

Phase voltages correctly labelled V_R, V_Y, VB

Accept suitable alternative labelling that differentiates 3 distinct line voltages and 3 distinct phase voltages.

Question 4(b):

Three sine waves.

Phase difference of 120° between any two.

Three waveforms are 120° out of phase.

Award 1 mark for correct labelling of phases 1, 2 and 3.

Question 4(c):

Award 1 mark for correct numerical result with unit.

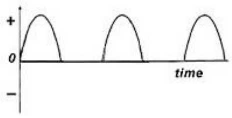
Accept 400V (European standard).

Question 4(d):

Award 1 mark for correct circuit diagram, must include reference to AC supply.

N.B. ignore '+' signs.

Allow up to 2 marks for correct explanation even if circuit diagram is incorrect. Must mention operation of diode. May also use diagrams in explanation i.e.



Examiners comments

Question 4(a) – Many candidates could recall the star formation, many of those also indicating the neutral line. But there was very little evidence of an understanding of the significance of line and phase voltages.

Question 4(b) – Few candidates appreciated that only one complete cycle should be depicted, with 1200 phase difference between the three waveforms.

Question 4(c) – Probably misreading the question, most candidates answered 230V or 240V.

Question 4(d) – Was generally well answered.

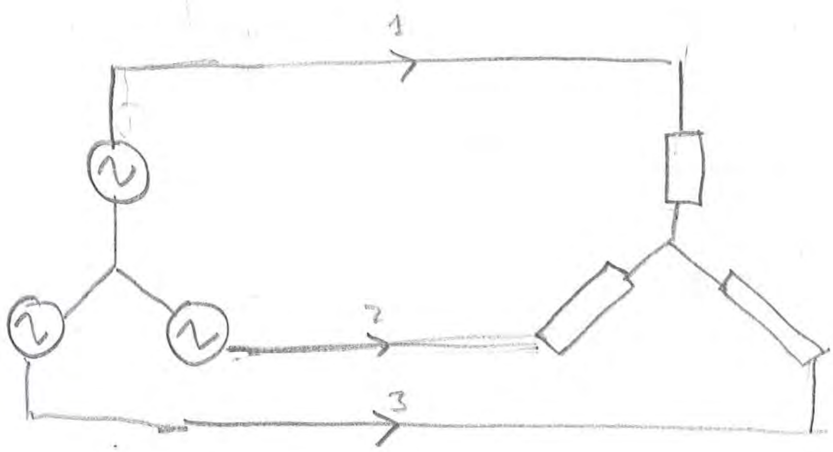
Exemplar Candidate Work

Question 4(a) – low level answer

4 A star connected three phase four wire network is widely used as a system of three phase electricity supply in the UK.

(a) Draw a circuit diagram that shows how this network is connected.

Indicate the phase voltages and the line voltages on the diagram.



Commentary

The diagram of a 3-phase incoming supply is not required, but if it is shown, then like the consumption network, it should include a common neutral line. Three resistors should be used to illustrate the separate loads carried by each phase, all connected to the neutral line – the "fourth wire" of the question text. The six distinct, measurable voltages developed by the star network need to be identified clearly as three line voltages and three phase voltages, although the manner of the labelling is not prescribed.

In this case the omission of the neutral line means no stable phase voltages nor measurable line voltages. The inclusion of the neutral line would have given some meaning to the scant labelling of the phase voltages. On the other hand there might still have been some attempt to represent the phase voltages.

Another common error has been to omit the resistors to represent the phase loads.

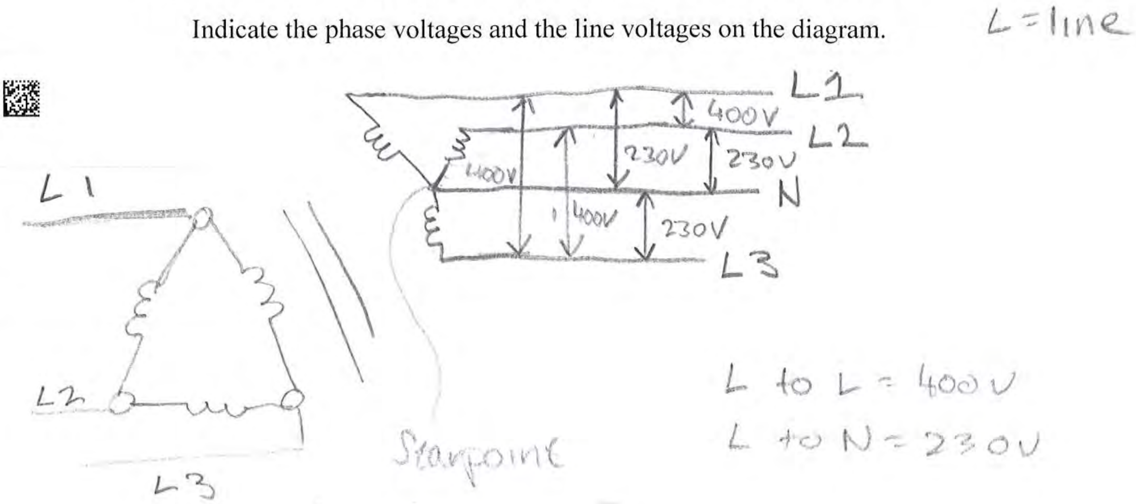
Exemplar Candidate Work

Question 4(a) – high level answer

4 A star connected three phase four wire network is widely used as a system of three phase electricity supply in the UK.

(a) Draw a circuit diagram that shows how this network is connected.

Indicate the phase voltages and the line voltages on the diagram.



Commentary

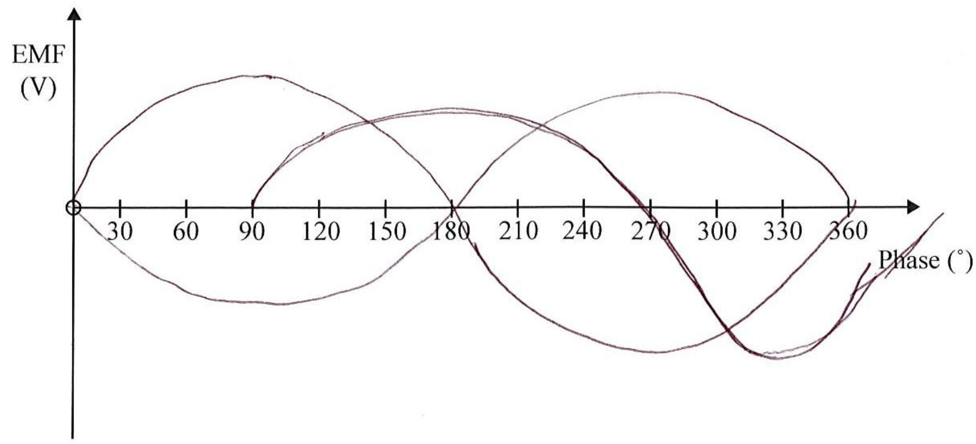
The incorrect delta pattern in this example can be ignored, although it should have been crossed through, because the other diagram is so well drawn and complete. The use of incorrect circuit symbols is also ignored. Full marks are accessed for the delta pattern of resistors representing phase loads, the common neutral line connected to all three lines, the properly differentiated line voltages and the phase voltages. Reference to colour coding as indicated in the mark scheme was not required therefore.

Exemplar Candidate Work

Question 4(b) – low level answer

(b) Sketch the waveforms which show one voltage cycle of a three phase supply.

Label phase 1, phase 2 and phase 3 on the sketch.



[4]

Commentary

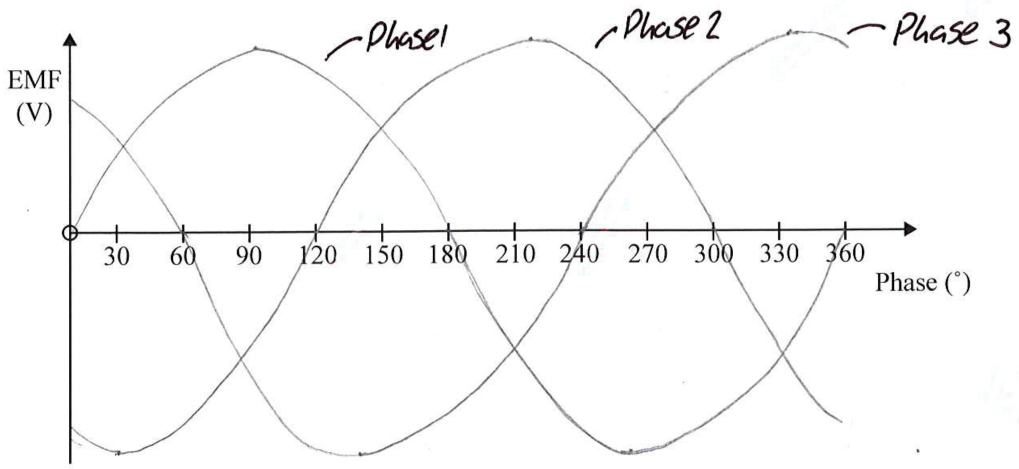
A low level answer would either depict one whole cycle of three distinct waveforms approximating to sinusoids or three waveforms of any description identified as being three distinct phases. The depiction of three sine waves was just sufficient for a low level answer, despite the absence of the first quarter cycle on one of them. However none of the phase differences were the expected 120°, and the waveforms were not identified as being separate phases, either of which elements would have lifted it to a medium level.

Exemplar Candidate Work

Question 4(b) – high level answer

(b) Sketch the waveforms which show one voltage cycle of a three phase supply.

Label phase 1, phase 2 and phase 3 on the sketch.



[4]

Commentary

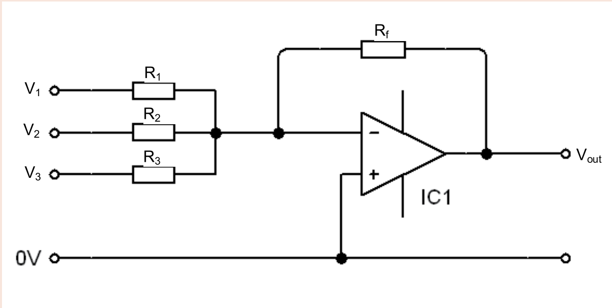
Care has been taken to show the essential features of three sine waves, namely continuous curves of similar amplitude and one complete wavelength. They have been drawn 120° out of phase with each other. They have been clearly labelled as three distinct phases. This answer earns full marks.

One common issue was to show more than one full wave, despite the given labelling of the horizontal axis.

Question 5

5 A summing amplifier is required for use in an audio mixer circuit.

(a) Draw a circuit diagram of a **three** input summing amplifier.



[3]

(b) State the formula for V_{out} in a **three** input summing amplifier.

$$V_0 = -R_f\left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + \frac{V_3}{R_3}\right)$$

.. **[1]**

(c) The input resistors in a **three** input summing amplifier each have a value of 10 kΩ. The feedback resistor is 50K Ω.

Calculate the value of V_{out} if the input voltages are 0.2 V, 0.5 V and 0.25 V.

$V_o = -50 \times (0.2/10 + 0.5/10 + 0.25/10)$
$= -4.75V$

.. **[2]**

Mark scheme guidance

Question 5(a):

Award 1 mark for each correct bullet (as shown below). Maximum 3 marks.

- Correct symbol for operational amplifier (+/- supply not required).
- Three input resistors connected to inverting input.
- Feedback resistor connected between output and inverting input.
- Non-inverting input connected to 0V/Gnd.

Question 5(b):

Or other arrangements of same formula.

Question 5(c):

Award 1 mark for correct substitution.

Award 1 mark for correct numerical result with unit.

Sign must be correct.

ECF: Award 1 mark if incorrect formula used but calculation correct, unit must be given.

Examiners comments

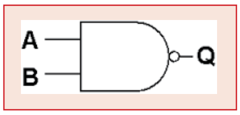
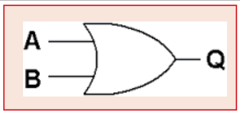
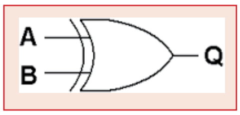
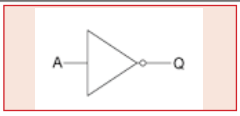
Question 5(a) – Few candidates were able to recall all the details of this complex circuit.

Question 5(b) – Fewer recalled the correct formula.

Question 5(c) – At least one mark could be gained by correct substitution and correct unit.

Questions 6(a) and (b)

6 **(a)** Complete the table below by drawing the correct logic gate symbol for each Boolean expression.

Boolean Expression	Logic Gate Symbol
$Q = \overline{A.B}$	
$Q = A + B$	
$Q = A \oplus B$	
$Q = \overline{A}$	

[4]

(b) A digital system will only operate if three switches **X**, **Y** and **Z** are correctly set. An output signal, Q=1, will occur if switches **X and Y** are both in the ON position **or** if **X** is in the OFF position **and** Z is in the ON positon. Assume ON=1, OFF =0.

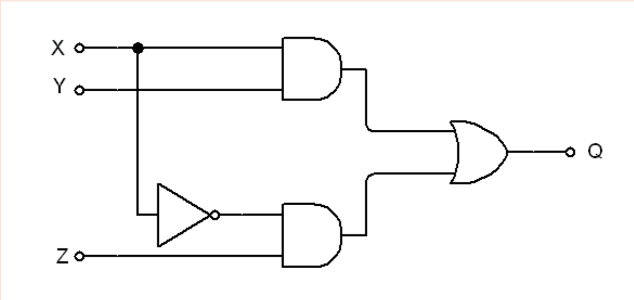
(i) Complete the truth table for the above system.

X	Y	Z	Q
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

[4]

Questions 6(b)(ii)

(ii) Draw a circuit diagram of the combinational logic that will be required in the digital system.



[4]

Mark scheme guidance

Question 6(a):

A, **B** and **Q** not required on Logic Gate symbols.

Question 6(b)(i):

Award 1 mark for every 2 correct rows in the table.

Question 6(b)(ii):

Award 1 mark for each correct Logic Gate, with correct connections and correct input labels.

Output label not required.

Examiners comments

Question 6(a) – Recall of the logic gate symbols was good. Two inputs to the NOT gate and confusion between the AND and OR symbols were the two commonest errors.

Question 6(b)(i) – Full mark responses to this question were commonplace.

Question 6(b)(ii) – If candidates gave a correct response to 6(b)(i), a good answer here commonly followed, despite scant evidence of the use of Boolean algebra.

The small print

We'd like to know your view on the resources we produce. By clicking on the 'Like' or 'Dislike' button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

Whether you already offer OCR qualifications, are new to OCR, or are considering switching from your current provider/awarding organisation, you can request more information by completing the Expression of Interest form which can be found here: www.ocr.org.uk/expression-of-interest

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications: resources.feedback@ocr.org.uk

Looking for a resource?

There is now a quick and easy search tool to help find **free** resources for your qualification:

www.ocr.org.uk/i-want-to/find-resources/

www.ocr.org.uk/engineering
OCR Customer Contact Centre

Vocational qualifications
Telephone 02476 851509
Facsimile 02476 851633
Email vocational.qualifications@ocr.org.uk

OCR is part of Cambridge Assessment, a department of the University of Cambridge. *For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored.*

Cambridge Assessment

LLOYD'S REGISTER · LRQA ISO 9001 UKAS MANAGEMENT SYSTEMS 001