

Examination Answer Books

12 Pages

Instructions to Candidates

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Complete, fold and seal
(see note 2 below)

SURNAME: De Vlugt

FORENAME(S): Calvin

1	Student Number	170818411
2	Title of Examination Paper	Electronic and Electrical Principles
3	Module Code	PSDE 4001
4	Date and Time of Examination	14 th May 2018 9:30 - 11:30
5	Examination Venue	68250
6	Seat Number	13
7	Number of Answer Books handed in	1

1 A a) Equivalent circuit

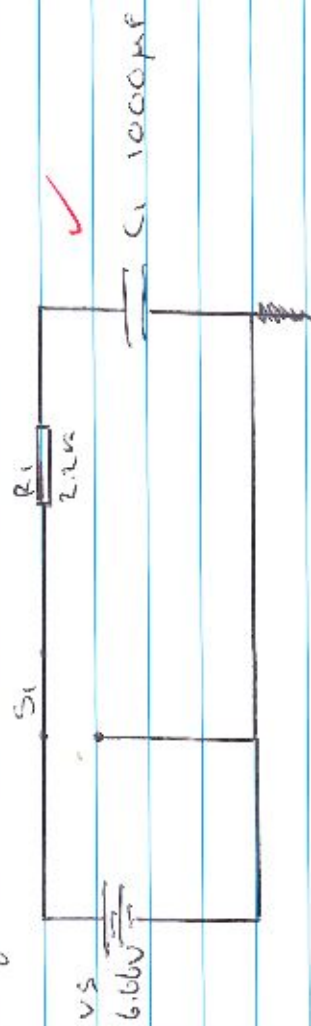
using the reduction method the resistors are in parallel.

$$\frac{R_1 \times R_2}{R_1 + R_2} = \frac{4 \times 5}{4 + 5} = \frac{20}{9} = \underline{2.2\Omega} \quad \checkmark$$

New V_S from voltage divider

$$New V_S = \frac{R_2}{R_1 + R_2} \times V_S = \frac{5}{4+5} \times 12 = \underline{6.66V} \quad \checkmark$$

Equivalent circuit



b) (i) Time constant:

$$T = R_1 \times C_1 = 2200 \times 0.001 = \underline{2.2 \text{ seconds}} \quad \checkmark$$

ii) Time taken for capacitor to fully charge is $5 \times T$

$$\text{Therefore, fully charged} = 5 \times T = 5 \times 2.2 = \underline{11 \text{ seconds}} \quad \checkmark$$

c) (i) charging

$$V_S = 6.66V, \quad T = 2.2 \text{ seconds}, \quad V_C = 3V$$

$$V_C = V_S [1 - e^{-t/T}]$$

$$3 = 6.66 [1 - e^{-t/2.2}] \quad \checkmark$$

[illegible]

Question No.	Examiner Only	Question No.	Examiner Only
	$I = \frac{50 \angle 30^\circ}{10 \angle 53.1^\circ} = 5 \angle -23.1^\circ \text{ A}$ ✓ b) Active power: $P = VI \cos \theta$ $P = [50 \times 5] \times \cos [30 - (-23.1)]$ ✓ $P = 250 \times \cos [53.1]$ ✓ $P = 150 \text{ watts}$ ✓ To obtain the reactive power convert $250 \cos (53.1)$ $250 \times \cos [53.1] = 150$ ✓ $250 \times \sin [53.1] = 200$ ✓ reactive power Apparent Power: $S = P + jQ$ ✓ $S = \sqrt{\text{Active Power}^2 + \text{reactive Power}^2}$ ✓ $S = \sqrt{150^2 + 200^2}$ ✓ $S = 250 \text{ VA}$ ✓ Active / True Power $P = 150 \text{ watts}$ ✓ Reactive Power $Q = 200 \text{ VAR}$ ✓ Apparent Power $S = 250 \text{ VA}$ ✓ ∴ c) original power factor = $\cos \theta = \cos [53.1] = 0.6$ ✓ P.F at 0.966 means that $\cos \theta = 0.966$ ✓ Hence, $\theta = \cos^{-1}(0.966)$ $= 15.8^\circ$ ✓ $= 15.8^\circ$ ✓		
	Power triangle $P = 150 \text{ watts}$ $Q = 200 \text{ VAR}$ P.F at 0.966 ✓ From the power triangle $\tan 15^\circ = \frac{AB}{150} \rightarrow \tan = \frac{\text{opp}}{\text{adj}}$ $AB = \tan 15^\circ \times 150$ $AB = 40.2 = Q$ ✓ Capacitor Value: $C = \frac{Q}{\omega V} = \frac{40.2}{3.14 \times 50} = 159.8 \text{ VAR}$ ✓ $C_{\text{new}} = 200 - 159.8 = 40.2 = 159.8 \text{ VAR}$ ✓ ~~Capacitance reactance~~ $I = \frac{Q_{\text{new}}}{V} = \frac{159.8}{50} = 3.2 \text{ A}$ Capacitance reactance $X_C = \frac{V}{I} = \frac{50}{3.2} = 15.625 \text{ ohms}$ $X_C = \frac{1}{\omega C} \rightarrow \text{convert equation}$ $C = \frac{1}{2\pi f X_C} = \frac{1}{2\pi \times 50 \times 15.625} = 5.1 \mu\text{F}$ ✓		

Question No.	Examiner Only	Question No.	Examiner Only
3B	a) Power per phase $= \frac{24}{3} = 8 \text{ kW}$ ✓ KVA per phase $= \frac{\text{True power}}{\text{Power factor}}$ $= \frac{8000}{0.8} = 10 \text{ KVA}$ ✓ $I_{ph} = \frac{\text{KVA}}{V} = 24.09 = 24.1$ ✓ $I_{ph} = 24.1 \cos^{-1}(0.8)$ $= 24.1 \cos^{-1}(0.8)$ ✓ $= 24.1 \angle 36.9^\circ$ ✓ use ~~24.1~~ $24.1 \angle 37^\circ$ as ry reference point. phase currents: $I_{ry} = 24.1 \angle 37^\circ$ ✓ $24.1 \times \cos(37) = 19.25$ ✓ $24.1 \times \sin(-37) = -14.5$ ✓ $I_{ry} = 19.25 - j14.5$ ✓ $I_{yb} = 24.1 \angle -120 - 37 = 24.1 \angle 157^\circ$ $24.1 \times \cos(-157) = -22.9$ $24.1 \times \sin(-157) = -9.4$ $I_{yb} = -22.9 - j9.4$ ✓ $I_{br} = 24.1 \angle 120 - 37 = 24.1 \angle 83^\circ$ $24.1 \times \cos(83) = 2.9$ $24.1 \times \sin(83) = 23.9$ $I_{br} = 2.9 + j23.9$ ✓		b) ~~$I_{ry} = I_{ry}$~~ Line currents $I_{ry} = I_{ry} - I_{br} = [19.25 - j14.5] - [2.9 + j23.9]$ $= [16.35 - j38.4]$ ✓ $\tan \theta = \left[\frac{-38.4}{16.35} \right]$ $\theta = \tan^{-1} \left[\frac{-38.4}{16.35} \right]$ ✓ $16.35 \times \cos(-67) = 6.39$ ~~6.39~~ <i>inverted current!</i> $I_{ra} = 6.39 \angle -67^\circ \rightarrow \text{with } \angle -67^\circ$ $I_{yb} = I_{yb} - I_{ry} = [-22.9 - j9.4] - [19.25 - j14.5]$ $= [-42.15 + j5.1]$ ✓ $\tan \theta = \left[\frac{5.1}{-42.15} \right]$ $\theta = \tan^{-1} \left[\frac{5.1}{-42.15} \right]$ $\theta = -6.899 = -7^\circ$ ✓ $-42.15 \times \cos \theta$ $-42.15 \times \cos(-7)$ $I_y = -41.8 \angle -7^\circ$ $I_b = I_{br} - I_{yb} = [2.9 + j23.9] - [-22.9 - j9.4]$ $= [25.8 + j33.3]$ $\tan \theta = \left[\frac{33.3}{25.8} \right]$ $\theta = \tan^{-1} \left[\frac{33.3}{25.8} \right]$ $\theta = 52.4^\circ$ ✓ $I_b = 25.8 \times \cos \theta$ $25.8 \times \cos(57)$ $I_b = 14.1 \angle 57^\circ$ <i>inverted current!</i>
Arholwr yn unig	Arholwr yn unig	Rhify Cwestiwn	Rhify Cwestiwn



SURNAME: Flockin

FORENAME(S): Philip

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1	Student Number	1708152/1
2	Title of Examination Paper	Elec + Electronic Principles
3	Module Code	PSDE4001
4	Date and Time of Examination	14/5/18 9.30am - 11.30pm
5	Examination Venue	68250
6	Seat Number	4
7	Number of Answer Books handed in	1

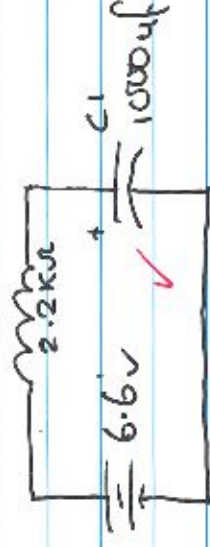
List the numbers of the questions you have attempted	Office Use
1	18
4	5
2	1
Office Use	25%

Q1A 1a Equivalent Resistance

$$R1 \times R2 \div R1 + R2 = 2.2 K\Omega \quad (4 \times 5) \div (4 + 5)$$

$$R2 \div R1 + R2 \times V_S = 5K \div 4K + 5K \times 12$$

$$R1 = 6.6V \quad \checkmark$$



$$\text{b) i) } T = C \times R \quad \therefore T = (1000 \times 10^{-6}) \times (2.2 \times 10^3)$$

$$T = 2.2 \text{ second} \quad \checkmark$$

$$\text{b) ii) } T \times 5 = 11 \text{ seconds} \quad \checkmark$$

$$\text{c) } V_C = V_S (1 - e^{-t/\tau}) \quad \checkmark$$

$$3 = 6.6 (1 - e^{-t/11})$$

$$3/6.6 - 1 = -e^{-t/11} \quad \checkmark$$

$$+0.54 = -e^{-t/11}$$

$$T = 2.2 \text{ seconds}$$

$$5T = 11 \text{ seconds}$$

$$\ln(+0.54) = -e^{-t/11}$$

$$-0.26 = -t/11$$

Correct method.

Capacitor with 5T and T

$$t = 11 \times 0.26$$

$$T = 2.2 \quad 5T = 11$$

$$t = 2.86 \text{ seconds} \quad \times$$

1c(ii) $V_C = V_S (e^{-t/\tau})$ ✓

$$\frac{3}{6.6} = 2^{-6/11}$$

$$0.45 = 0.5$$

$$\ln(0.45) = -0.8 \quad \checkmark$$

$$-0.798 = -\frac{1}{9} \quad T = 2.2 \quad S_T = 11$$

$$t = 11 \times 0.798$$

$$c = 8.778 \text{ second}$$

16) $2 \div 100 = 0.02$ ✓

(b) $V \div R = 5 \div 100 = 0.05$ ✓

②: $t = \ln(I_{1x} I_{2x})$ X formula is incorrect.

$$t = \ln(25 \text{ mA} \times 50 \text{ mA})$$

$$t = 7.130 \text{ seconds}$$

①: $t = \ln(30\text{mA} \times 50\text{mA})$

$$t = 7.313 \text{ seconds} \quad \times$$

$$\sqrt{10^6} = 10^3$$

Arbeitsgruppen

Unit 7: Investment

fundamental

Summary

2
10
8

62

報

Question 7

$$Z_T = (Z_1 \times Z_2) \div (Z_1 + Z_2) + 23$$

$$\therefore Z_T = (6 - j4 \times 6 + j8) \div (6 - j4 + j8) + (4.6 - j8)$$

$$6-j4 \times 6+j8 = 36+j48-j24-j32$$

(where $j = -j^2$) let it be 1 and where it j^2 let it be -1

$$\therefore 36 + j24 + 32$$

$$(21 \times 22) = 68 + 124 \checkmark$$

$$Z_1 + Z_2 = (6 - j4) + (6 + j8) = (12 + j4)$$

$$Z_1 + Z_2 = (12 + 54)$$

$$\therefore (68 + j24) \div (12 + j54) = 5.6 + j56$$

$$(5.6 + j6) + (4.6 - j8) = 10.2 - j2$$

$$\therefore Z_T = 10.2 - j2$$

45) $R + L = 25 + 0.4 = 25.4$

Q.ii) $V \div \text{Impedance} = 200 \div 25.4 = 7.87 \text{ A}$

(viii) $I \times R = 7.87 \times 25 = 196.75 \text{ V}$

(a.iii) $I_{VL} = 7.87 \times 0.4 = 3.148 \checkmark$

(4Bb) $PD_{across R} + PD_{across L} = 196.75 + 3.148$
 $= 199.9$ equivalent to Supply Voltage X

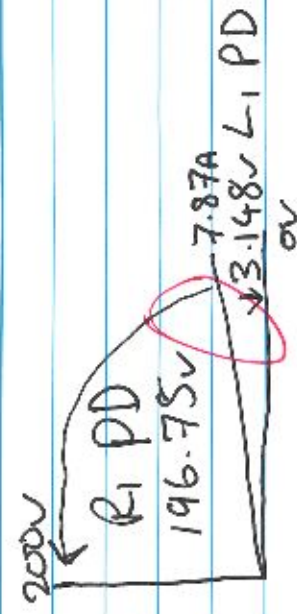
Arbeitsgruppen

Unit 7: Investment

fundamental

Summary

c)



$$I_{\text{total}} = 10.018 \text{ A}$$

Q22

$$a) (2\pi FR)^2 = 1/LC \div R^2 /$$

$$2\pi(2000)^2 =$$

$$b) RD =$$

$$bii) \text{ ~~2000 \times 2000~~ }$$

$$biii) \text{ DNA (did not answer) }$$

$$biv) \text{ Bandwidth} = FR /$$

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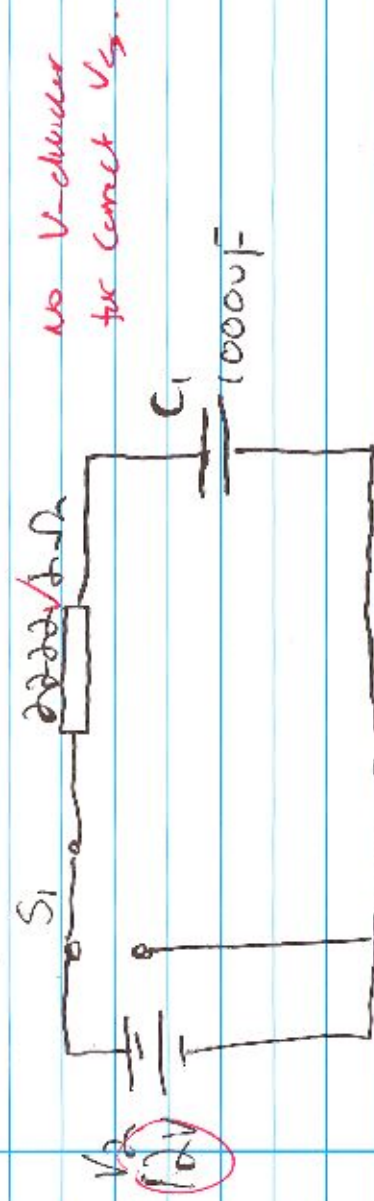
FORENAME(S): CALLUM,
ANTHONY

1	Student Number	1708182/1	List the numbers of the questions you have attempted	Office Use
2	Title of Examination Paper	PSED 4001 Elec + Elec principles	1	20.5
3	Module Code	4001	4	4
4	Date and Time of Examination	14/MAY/2018 9:30 - 11:30	2	0
5	Examination Venue	68250		
6	Seat Number	21		
7	Number of Answer Books handed in	1	Office Use	24%

Q1A) $\frac{R_1 \times R_2}{R_1 + R_2} = \frac{4k \times 5k}{4k + 5k} = 2222.2 \Omega$ ✓

$V = IR$ $I = \frac{V}{R}$ $I = \frac{12}{2222.2}$

$I = 5.4 \times 10^{-3} A$, $5.4 mA$



b) i) $T = C \times R = 1000 \times 10^{-6} \times 2222.2$ ✓
 $= 2.22 \text{ Seconds}$

ii) $5T = 2.22 \times 5 = 11.1 \text{ Seconds}$ ✓

c) i) 2222.2Ω

$3V = 12 \times (1 - e^{-t/T})$

$\frac{3}{12} = 1 - e^{-t/T}$

$0.25 - 1 = -e^{-t/T}$ ✓
 $0.75 = -e^{-t/T}$ ✓

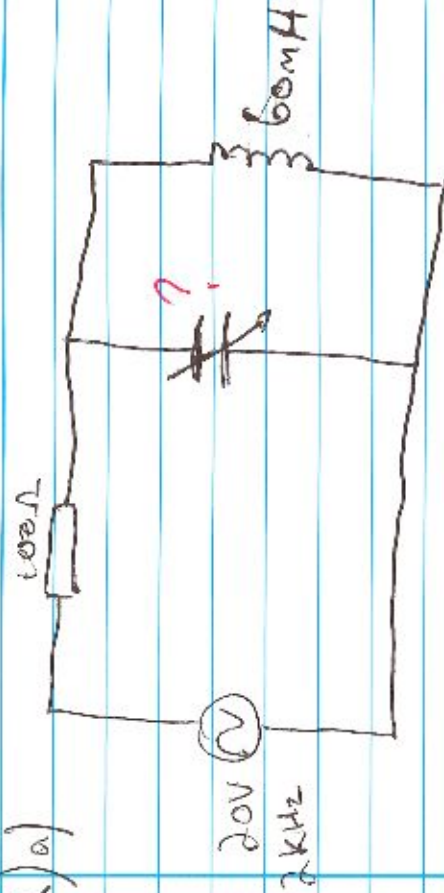
Using log rules:

$\ln(0.75) = -\frac{t}{T}$ ✓
 $-0.2877 = -\frac{t}{T}$ ✓

$-0.2877 \times 2.22 = -t$
 $t = 0.6387 \text{ Seconds}$

Question No.

Q2(a)



Examiner Only

Question No.

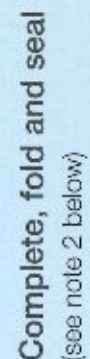
Examiner Only

Arholwr yn unig

Rhify Cwestiwn

Arholwr yn unig

Rhify Cwestiwn



SURNAME: LLOYD

FORENAME(S): TYLER

FORENAME(S): TYLER

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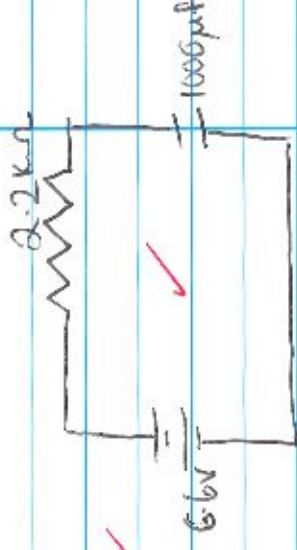
1	Student Number	1708157/1
2	Title of Examination Paper	ELEC. PRINCIPLES
3	Module Code	PDSE 4001
4	Date and Time of Examination	9:30 ~ 11:30
5	Examination Venue	COLLEGE SIR RICHARD
6	Seat Number	6
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1A	33.5
1B	
2	
4A	
Office Use	37%

(1A)

a) Thevenin Equivalent circuit

$$\frac{R1 \cdot R2}{R1 + R2} = \frac{4k \cdot 5k}{4k + 5k} = 2.2k \Omega \quad \checkmark$$

find new V_S for voltage divider:

$$\frac{R2}{R1 + R2} \times V_S = \frac{5k}{4k + 5k} \times 12 = 6.6V \quad \checkmark$$

b) Time Constant $(\tau) = C \times R$

$$= 1000 \times 10^{-6} \times 2200 = 2.2 \text{ seconds} \quad \checkmark$$

(ii) To fully charge = 5τ

$$5 \times 2.2 \text{ seconds} = 11 \text{ seconds} \quad \checkmark$$

c) From discharged state

$$V_C = V_S (1 - e^{-\frac{t}{\tau}})$$

$$3 = 6.6 (1 - e^{-\frac{t}{\tau}}) \quad \checkmark$$

$$\frac{3 - 1}{6.6} = e^{-\frac{t}{\tau}}$$

$$\ln(0.54) = -e^{-\frac{t}{\tau}} \text{ using log rules}$$

$$-0.6 = -\frac{t}{\tau}$$

$$t = 0.6 \times 2.2$$

$$t = 1.32 \text{ seconds} \quad \checkmark$$

$$(ii) V_C = V_S (e^{-\frac{t}{\tau}}) = 3 = 6.6 (e^{-\frac{t}{\tau}}) \quad \checkmark$$

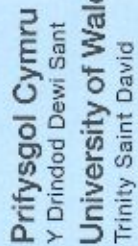
$$\frac{3}{6.6} = e^{-\frac{t}{\tau}}$$

$$= \ln(0.45) = -\frac{t}{\tau} \text{ using log rules}$$

$$-0.8 = -\frac{t}{\tau}$$

$$t = 0.8 \times 2.2 = 1.76 \text{ seconds} \quad \checkmark$$

Question No.	Examiner Only	Question No.	Examiner Only	Examiner Only
		4)	$ZT = \frac{21 \times 22}{21 + 22} + 23$ $ZT = \frac{(6-j4) \times (6+j8)}{(6-j4) + (6+j8)} + (4.6-j8)$ $ZT = \frac{(36-j32)}{(12+j4)} + (4.6-j8)$ $ZT = (3-j8) + (4.6-j8)$ $ZT = 7.6-j16$	1
Arholwr yn unig	Rhify Cwestiwn	Arholwr yn unig		Rhify Cwestiwn



Examination Answer Books

12 Pages

Instructions to Candidates

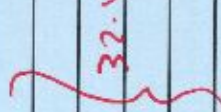
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SURNAME: Williams

FORENAME(S): Callum

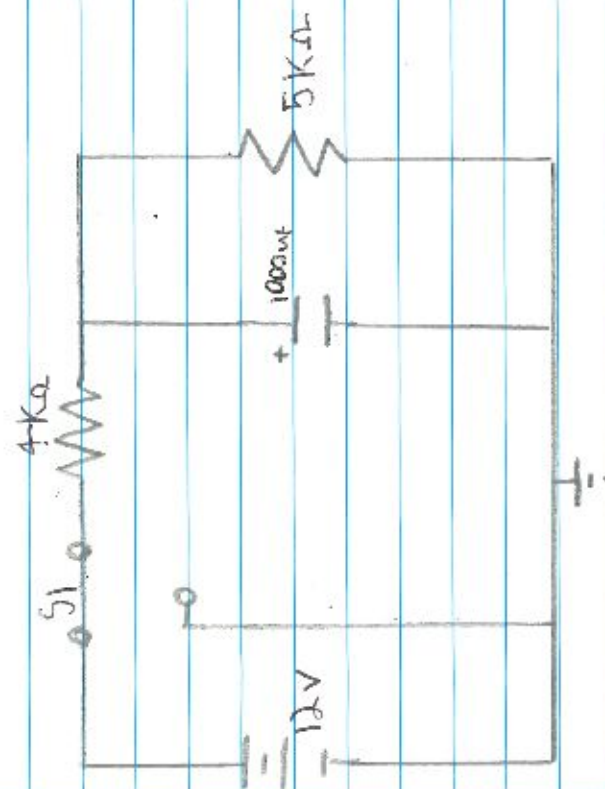
1	Student Number	1708176 / 1
2	Title of Examination Paper	Electrical & Electronic principles
3	Module Code	PSDE4001
4	Date and Time of Examination	14 th May 2018
5	Examination Venue	68250
6	Seat Number	22
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1A A	 32.5
Q1B B	
Q1C C	
Q1D D	
Q1E E	
Q1F F	
Q2A A	1
Q2B B	8
Q2C C	
Q2D D	
Q2E E	
Q2F F	
Q3A A	
Q3B B	
Q3C C	
Q3D D	
Q3E E	
Q3F F	
Q4A A	
Q4B B	
Q4C C	
Q4D D	
Q4E E	
Q4F F	
Office Use	14/01

(Gweler yr ochr arall am y fersiwn Cymraeg)

Q1

A



Equivalent circuit:

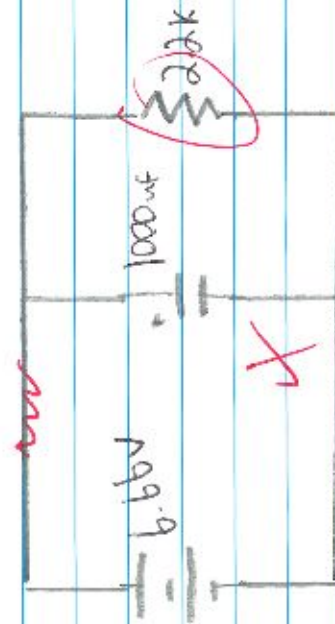
Resistors in parallel

$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{4k} + \frac{1}{5k} = 2.2k \checkmark$$

New Voltage:

$$\frac{R_2}{R_1 + R_2} \times V_s = V_c \quad \left(\frac{5k}{4k + 5k} \right) \times 12$$

$$= 6.66V \checkmark$$



is series not parallel!

Question No.	Examiner Only	Question No.	Examiner Only
Q1. b)		Q1. c) i)	Discharging to reach 3V
i) Time Constant:			$V_C = V_S - e^{-t/\tau}$ So $3 = 6.66 - e^{-t/2.2}$
$T = R \times C$ So $T = 2.2 \text{ k}\Omega \times 1000 \mu\text{F}$			$\frac{V_C}{V_S} = -e^{-t/\tau}$ $\left(\frac{3}{6.66}\right) = -e^{-t/2.2}$
$0.001 \text{ F} = 1000 \mu\text{F}$ $2.2 \text{ k}\Omega = 2200 \Omega$	1		$\ln\left(\frac{V_C}{V_S}\right) = -t/\tau$ $\ln\left(\frac{3}{6.66}\right) = -t/2.2$
ii) Time taken for Capacitor to fully charge			$\left(\ln\left(\frac{V_C}{V_S}\right)\right) \times \tau = -t$ $(0.7975) \times 2.2 = -t$
$5 \times T$ So 5×2.2 Seconds			$= 1.754 \text{ seconds}$ R.2.D.P.
$= 11$ Seconds	2	Q1. c)	
i) Time taken to reach 3V from discharged state		a)	
$V_C = V_S (1 - e^{-t/\tau})$ $V_C = 3 \text{ V}$ $V_S = 6.66 \text{ V}$ $T = 2.2$			
Re arrange to make $-t$ the subject.			
$\frac{V_C - 1}{V_S} = e^{-t/\tau}$ So $\left(\frac{3}{6.66}\right) - 1 = e^{-t/\tau}$			
$\ln\left(\frac{V_C}{V_S}\right) - 1 = -t/\tau$ $\ln(0.55) = -t/\tau$		a)	Time Constant
$\left(\ln\left(\frac{V_C}{V_S}\right) - 1\right) \times \tau = -t$ $-0.5978 \times 2.2 = -t$			$T = \frac{L}{C} = \frac{2}{100}$
$= 1.315$ seconds			$T = 0.02 \text{ seconds}$
or $= 1.32$ seconds R.2.D.P.	5	b)	Current: $I = V/R$ Ohms law
			$= 0.05 \text{ A}$ or 50 milliAmp
			$50 \text{ mA} = I_{\text{max}}$

Question No.	Examiner Only	Question No.	Examiner Only
Q4A	$Z_1 + Z_2$ $(Z_1 + Z_2)$ $(6 - j4) + (6 + j8) = (12 + j4)$ $Z_1 + Z_2 = (12 + j4)$ Use Complex Conjugate to work out $Z_1 \times Z_2$ $\frac{28 + j24}{12 + j4} \times 12 - j4$ $(28 + j24)(12 - j4) = 336 - 112j + 288j - j^2 96$ $= 336 - 112j + 288j + 96$ Re arrange: $= (336 + 96) (-112j + 288j)$ $= (432) + (176j)$ $(Z_1 \times Z_2) \times (12 - j4) = (432) + (176j)$ $(12 + j4) \times (12 \times j4) = 12^2 + 4^2$ $= 160$ So $Z_T = \left(\frac{430 + 176j}{160} \right) + Z_3 = \text{Ans}$ $= \frac{2.69 + 1.1j}{7.29 - 6.9j}$ $Z_T = 7.29 - 6.9j$	Q4 iv) bandwidth (f2-f1)	
	$Z_T = 7.29 - 6.9j$ $10m = 7$		

Examination Answer Books

12 Pages

Instructions to Candidates

- 1. Please give the information requested in the boxes below.
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ROSS

1	Student Number	~~DELETED~~ 1708154/11	List the numbers of the questions you have attempted	Office Use
2	Title of Examination Paper	Elec + Elec Principles	1	32
3	Module Code	PDSE 4001	2	9 1/2
4	Date and Time of Examination	14th MAY 2018	4	1
5	Examination Venue	68250 C27		
6	Seat Number	16		
7	Number of Answer Books handed in			
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33.
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47.4%

1A) a) equivalent circuit

Using circuit reduction methods, the ~~circuits~~ ^{resistors} are in parallel

$$\frac{R_1 \times R_2}{R_1 + R_2} = \frac{4\text{K}\Omega \times 5\text{K}\Omega}{4\text{K}\Omega + 5\text{K}\Omega}$$

$$= \frac{20\text{K}\Omega}{9\text{K}\Omega}$$

$$= 2.2\text{K}\Omega \quad \checkmark$$

New VS across voltage divider

$$\left(\frac{R_2}{R_1 + R_2} \right) \times V_S$$

$$\frac{5\text{K}\Omega}{4\text{K}\Omega + 5\text{K}\Omega} \times 12\text{V}$$

$$= 6.66\text{V} \quad \checkmark$$

b) Time constant

$$1) T = R \times C$$

$$T = 2.2\text{K}\Omega \times 1000\mu\text{F}$$

$$T = 2.2\text{s} \quad \checkmark$$

$$ii) 5 \times T$$

$$5 \times 2.2\text{s}$$

$$\text{Time taken to fully charge} = 11\text{s} \quad \checkmark$$

Question No.	Examiner Only	Question No.	Examiner Only
c) Time taken for capacitor to reach 3V from:- ii) a fully discharged state $V_C = V_S(1 - e^{-t/\tau})$ $3V = 6.66V(1 - e^{-t/\tau})$ $\frac{3V}{6.66V} = (e^{-t/\tau})$ $\ln(0.55) = (-t/\tau)$ using log rules $0.6 = -t/\tau$ $t = 0.6 \times \tau$ $t = 0.6 \times 2.2$ $t = 1.32 \text{ Seconds}$		1B) a) Time constant $T = \frac{L}{R}$ $T = \frac{2H}{100\Omega}$ $T = 0.02S$ b) Steady state current $I = \frac{V}{R}$ $I = \frac{5}{100}$ $I = 50mA$ c) Time taken after the switch is changed over for current to fall to:- $i_o = 25mA$ $i_o = 30mA$ $t = T \left(\ln \left(\frac{I_L}{I_{max}} \right) \right)$ $t = 0.02 \left(\ln \left(\frac{I_L}{I_{max}} \right) \right)$ $t = 0.02 \left(\ln \left(\frac{25mA}{30mA} \right) \right)$ $t = 13.9ms$ $t = 10.2ms$	
ii) a fully charged state $V_C = V_S(e^{-t/\tau})$ $3V = 6.66V(e^{-t/\tau})$ $\frac{3V}{6.66V} = (e^{-t/\tau})$ $\ln(0.45) = (-t/\tau)$ using log rules $0.8 = -t/\tau$ $t = 0.8 \times \tau$ $t = 0.8 \times 2.2$ $t = 1.76 \text{ Seconds}$		$t = 0.02 \left(\ln \left(\frac{30mA}{50mA} \right) \right)$ $t = 10.2ms$ Total = 33	

2) a) Auto required capacitance and circuit arrangement

$$fL = \frac{1}{2\pi} \sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$$

$$2\pi fL^2 = \frac{1}{LC} - \frac{R^2}{L^2}$$

$$\frac{1}{LC} = 2\pi fL^2 + \frac{R^2}{L^2}$$

$$C = \frac{1}{L} \left(2\pi fL^2 \right)^2 + \left(\frac{R^2}{L^2} \right)$$

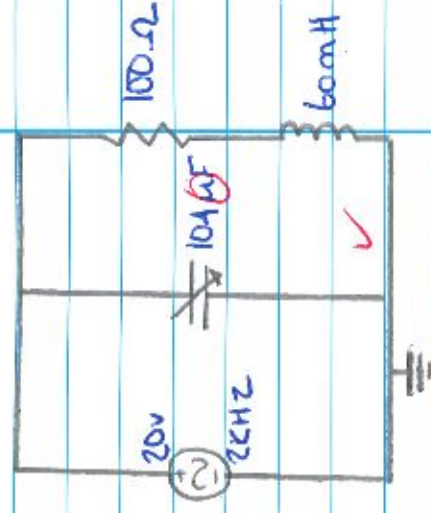
$$C = \frac{1}{60 \times 10^{-3}} \times \left(2\pi \times 2000 \times 60 \times 10^{-3} \right)^2 + \frac{100^2}{60 \times 10^{-3}^2}$$

$$C = 104 \mu F \text{ at}$$

b) i) The dynamic resistance

$$R_D = \frac{V}{R_L} \frac{L}{\omega C}$$

$$R_D = 20V$$



ii) Supply Current

$$I = \frac{V}{5.6K} \quad 5.76K$$

$$I = \frac{20}{5.6K} \quad \checkmark$$

→ 5.76K

$$I = 3.57mA \quad ?$$

iii) Q factor

$$= \frac{2\pi fL}{R}$$

$$= \frac{2\pi \times 2000 \times 60 \times 10^{-3}}{100}$$

$$= 7.53 \quad \checkmark$$

iv) Bandwidth = $f_2 - f_1$ ✓

$$f_2 - f_1 = f_r \quad \checkmark$$

$$\text{If } f_r^2 =$$

$$f_{om} = 9 \frac{1}{2}$$

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4A)

$$Z_T = \frac{Z_1 \times Z_2}{Z_1 + Z_2} + Z_3$$

$$Z_T = (6 - j4 \times 6 + j8) \div (6 - j4 + 6 + j8) + (4.6 - j8)$$

$$Z_T = (36 - j32) \div (12 - j4) + (4.6 - j8)$$

$$Z_T = (3 + j2.6) + (4.6 - j8)$$

$$Z_T = (7.6 - j5.4)$$

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