

ACDA4006-Assessment-JLE- 2011912

by Josh Luke Evans

Submission date: 14-Jan-2022 12:21PM (UTC+0000)

Submission ID: 168970620

File name: 27110_Josh_Luke_Evans_ACDA4006-Assessment-JLE-2011912_395682_534133257.docx (6.63M)

Word count: 33

Character count: 182

Electrical and Electronic Principles Assessment

I declare that this assessment is the product of my own work and is not being submitted for any other degree, etc.

Signed: Joshua Evans (electronically on 14/01/2022)

ACDA4006	Electrical and Electronic Principles Assessment	2011912
----------	---	---------

1)

$$a) \quad 100 + 310 = 410 \Omega$$

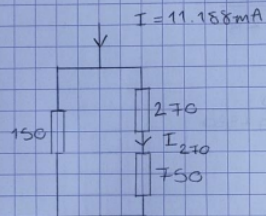
$$270 + 750 = 1020 \Omega$$

$$\frac{1020 \times 150}{1020 + 150} = 130.769 \Omega$$

$$410 + 130.769 + 330 + 470 = 1,340.769 \Omega$$

$$b) \quad I = \frac{V}{R} = \frac{15V}{1,340.769} = 11.188 \text{ mA}$$

c)



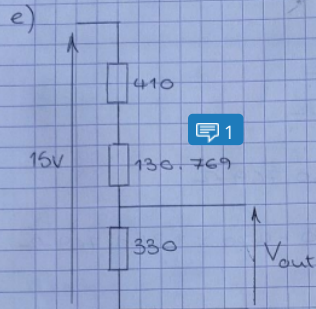
$$I_{270} = I_{in} \times \frac{R_B}{R_A + R_B}$$

$$= 11.188 \text{ mA} \times \frac{150}{270 + 150}$$

$$I_{270} = 3.996 \text{ mA}$$

$$d) \quad P = IV = 11.188 \text{ mA} \times 15V = 167.82 \text{ mW}$$

ACDA4006 Electrical and Electronic Principles Assessment 2011912



$$V_{out} = V_{in} \frac{R_B}{R_A + R_B}$$

$$= 15 \times \frac{330}{540.769 + 330}$$

$$V_{out} = 5.685V$$

$$P = \frac{V^2}{R} = \frac{5.685^2}{330}$$

$$P_{L4} = 97.937mW$$

$$j) 1340.769 - 470 = 870.769 \Omega$$

$$I = \frac{V}{R} = \frac{15}{870.769}$$

$$I = 17.226mA$$

ACDA4006	Electrical and Electronic Principles Assessment	2011912
----------	---	---------

2)

a) $4 \times 100 \text{ ms} = 400 \text{ ms}$

b) Period =

$$f = \frac{1}{T} = \frac{1}{400 \times 10^{-3}} = 2.5 \text{ Hz}$$

c) $4 \times 500 \text{ mV} = 2000 \text{ mV} = 2 \text{ V}$

d) $\text{r.m.s} = \frac{V_{\text{pk}}}{\sqrt{2}} = \frac{1 \text{ V}}{\sqrt{2}} = 0.707 \text{ V}_{\text{r.m.s}}$

ACDA4006 Electrical and Electronic Principles Assessment 2011912

3) $R = 400\Omega$, $C = 10\mu F$, $V_0 = 12V$

a) $V_C = V_0 (e^{-t/\tau})$

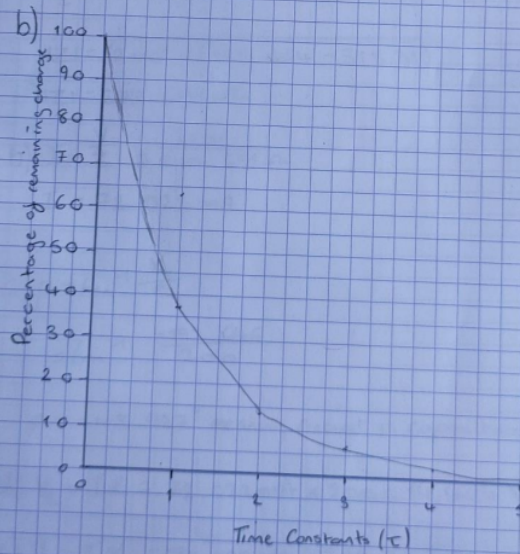
$$= 12 (e^{-1.6/\tau})$$

$$\tau = RC = 40,000 \times (10 \times 10^{-6})$$

$$\tau = 0.4$$

$$V_C = 12 (e^{-1.6/0.4})$$

$$V_C = 0.22V$$



ACDA4006	Electrical and Electronic Principles Assessment	2011912
----------	---	---------

4)

$$a) |Z| = \sqrt{R^2 + (X_L - X_C)^2}$$

$$X_L = 2\pi fL$$

$$= 2\pi \times 100 \times 200 \text{ mH}$$

$$X_L = 125.664 \Omega$$

$$X_C = \frac{1}{2\pi fC}$$

$$= \frac{1}{2\pi \times 100 \times 5 \mu\text{F}}$$

$$X_C = 318.31 \Omega$$

$$|Z| = \sqrt{200^2 + (125.664 - 318.31)^2}$$

$$|Z| = 277.691 \Omega$$

$$b) I = \frac{V}{Z} = \frac{20\text{V}}{277.691 \Omega}$$

$$I = 72.022 \text{ mA}$$

$$c) \phi = \tan^{-1} \frac{X_C}{R}$$

$$= \tan^{-1} \frac{-318.31}{200}$$

$$\phi = -43.927^\circ \text{ meaning circuit is capacitive}$$

$$d) V_L = IR = 72.022 \text{ mA} \times 200 = 14.404 \text{ V}$$

$$e) V_C = IX_C = 72.022 \text{ mA} \times 318.31 = 22.925 \text{ V}$$

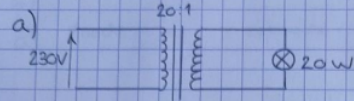
$$f) V_L = IX_L = 72.022 \text{ mA} \times 125.664 = 9.051 \text{ V}$$

ACDA4006 Electrical and Electronic Principles Assessment 2011912

$$\begin{aligned} g) f_{res} &= \frac{1}{2\pi\sqrt{LC}} \\ &= \frac{1}{2\pi\sqrt{200 \times 10^{-3} \times 5 \times 10^{-6}}} \\ f_{res} &= 159.155 \text{ Hz} \end{aligned}$$

ACDA4006 Electrical and Electronic Principles Assessment 2011912

5)



b) $V_s = V_p \times \frac{1}{N}$

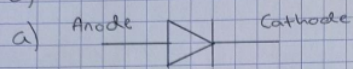
$$= 230 \times \frac{1}{20} = 11.5 \text{ V}$$

$$I = \frac{P}{V} = \frac{20 \text{ W}}{11.5 \text{ V}} = 1.739 \text{ A}$$

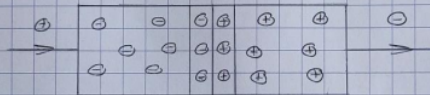
c) $I_p = \frac{P}{V_p} = 86.96 \text{ mA}$

ACDA4006 Electrical and Electronic Principles Assessment 2011912

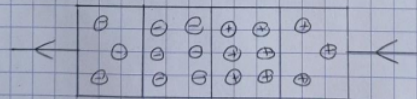
6)



b) A diode can be forward or reverse biased depending on the potential barrier within the diode. When a diode is forward biased, there is a forward current flowing across the diode, which narrows the depletion barrier and allows electrons to pass, as shown below.



When the diode is reverse biased, the depletion barrier widens as the free electrons are attracted away from the junction.



FINAL GRADE

77 / 100

GENERAL COMMENTS

Instructor

Total 54 Marks out of 70

$54 / 70 \times 100 = 77\%$

Q1 - 13 Marks total

- a) 2 Marks (incorrect circuit used - R4 & R7 are not in series)
- b) 2 Marks (Error Carried Forwards)
- c) 2 Marks ECF
- d) 2 Marks ECF
- e) 1 Mark (voltage on R7 should be taken into account)
- f) 4 Marks ECF

Q2 - 5 Marks total

- a) 1 Mark
- b) 1 Mark
- c) 1 Mark
- d) 2 Marks

Q3 - 7 Marks total

- a) 3 Marks
- b) 4 Marks - graph not specific to this problem, should have voltages not %
- c) 0 Marks
- d) 0 marks

Q4 - 14 Marks total

- a) 2 Marks
- b) 2 Marks
- c) 2 Marks
- d) 2 Marks
- e) 2 Marks
- f) 2 Marks
- g) 2 Marks

Q5 - total 6 Marks

- a) 2 Marks
- b) 2 Marks
- c) 2 Marks

Q6 - total 9 Marks

a) 2 Marks

b) 7 Marks - missing n-type and p-type silicon description, and breakdown voltage

PAGE 1

PAGE 2

PAGE 3



Comment 1

What about R7 (470R) ? Where has that gone?

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9
