



Complete, fold and seal
(see note 2 below)

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 either ignore 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.

SURNAME: JONES

FORENAME(S): NICHOLAS TIM

1	Student Number	P149676
2	Title of Examination Paper	Electrical and electronic Principles
3	Module Code	ACDA4002
4	Date and Time of Examination	21/5/18 15:00
5	Examination Venue	Gym Townhill
6	Seat Number	6012

7	Number of Answer Books handed in	1
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List the numbers of the questions you have attempted	Office Use
①	9
2, ~~5~~	3
③	5
4, a	5
4, b, c	
2, a, ii	
2, a, iii	
2, b	
2, c	
Total	22/35

9
3
5
5

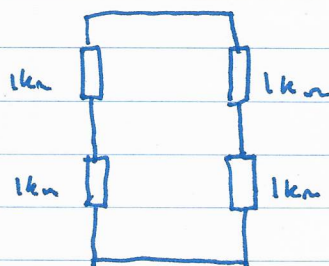
62.9%

22/35 Gary

(1)

i) a)

$V_s = 50V$



$$R_T = \frac{2000 \times 2000}{4000}$$

$$\underline{\underline{R_T = 1k\Omega}}$$

(2)

$$\begin{aligned} b) \quad I_s &= \frac{V}{R} \\ I_s &= \frac{12V}{1000} \\ I_s &= 0.012 \\ \underline{\underline{I_s = 12mA}} \end{aligned}$$

$$I_s = \frac{50}{1000}$$

$$I_s = 0.05$$

$$I_s = 50mA$$

(1)

$$c) \quad \frac{P}{V I}$$

$$\begin{aligned} P &= 12 \times 0.012 \\ P &= 0.144 \\ \underline{\underline{P = 144mW}} \end{aligned}$$

$$P = 50 \times 0.05$$

$$P = 2.5W$$

(2)



①

ii)

$$a) \text{ Period} = 40 \text{ ms}$$

$$b) \text{ Freq} = \frac{1}{0.040}$$

$$\text{Freq} = 25 \text{ Hz}$$

$$* c) \text{ Pk-Pk} = 8 \text{ V}$$

$$* d) \text{ R.M.S} = 8 \times 0.707$$

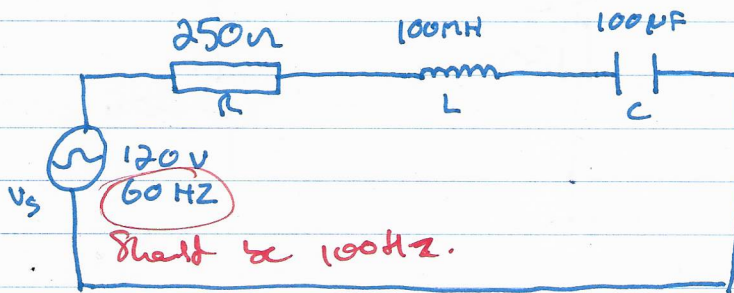
$$\text{R.M.S} = 5.656$$

$$X_L = 2\pi fL$$

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

a)

i)



$$V_R = V_s \times \frac{R}{R + X_L + X_C}$$

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

$$X_L = 37.70 \Omega$$

(1)

$$X_C = \frac{1}{2\pi 60 \times 100 \times 10^{-6}}$$

$$X_C = 26.53 \Omega$$

(1)

$$V_R = 120 \times \frac{250}{250 + 37.70 + 26.53}$$

$$V_R = 120 \times \frac{250}{314.23}$$

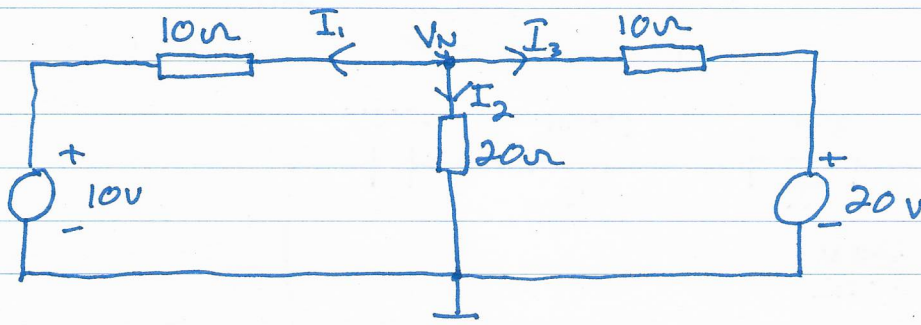
2 wrong method.

$$V_R = 120 \times 0.796$$

$$\underline{\underline{V_R = 95.52 \text{ V}}}$$

* continued at end of book *

③



$$I_1 + I_2 + I_3 = 0 \quad \checkmark$$

$$I_1 = \frac{V_N - 10}{10} \quad \checkmark$$

$$I_2 = \frac{V_N}{20} \quad \checkmark$$

$$I_3 = \frac{V_N - 20}{10} \quad \checkmark$$

$$\frac{V_N - 10}{10} + \frac{V_N}{20} + \frac{V_N - 20}{10} = 0 \quad \checkmark$$

$$\frac{20(V_N - 10)}{10} + V_N + \frac{20(V_N - 20)}{10} = 0$$

$$2(V_N - 10) + V_N + 2(V_N - 20) = 0$$

$$2V_N - 20 + V_N + 2V_N - 40 = 0 \quad \checkmark$$

$$5V_N - 60 = 0 \quad \checkmark$$

$$5V_N = 60 \quad \checkmark$$

$$V_N = \frac{60}{5} \quad \checkmark$$

$$V_N = 12V \quad \checkmark$$

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

$$I = \frac{12}{20}$$

$$I = 0.6 \text{ A}$$

current flowing through 20Ω resistor is

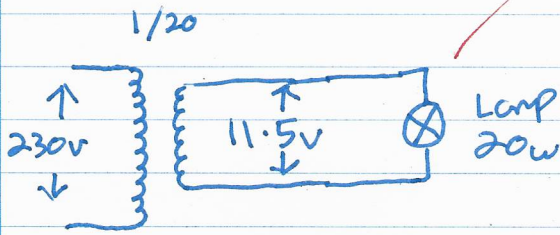
600mA

5



④

a) 230v 20w Lamp 1/20 ratio.



①

$$b) \quad I = \frac{V}{R} \quad P = VI$$

$$I = \frac{P}{V}$$

$$I = \frac{20}{11.5}$$

$$I = \underline{\underline{1.739 \text{ A}}}$$

②

$$* c) \quad I = \frac{1.739}{20}$$

$$I = 0.08695 \text{ A}$$

②

Cont.

(2)

$$ii) V_C = 120 \times \frac{X_C}{R + X_L + X_C}$$

$$R = 250 \Omega$$

$$X_L = 37.7 \Omega$$

$$X_C = 26.53 \Omega$$

$$Z = 314.23 \Omega$$

$$V_C = 120 \times \frac{26.53}{250 + 37.7 + 26.53}$$

$$V_C = 120 \times \frac{26.53}{314.23}$$

$$V_C = 120 \times 0.08443$$

$$\underline{\underline{V_C = 10.1316 \text{ V}}}$$

$$iii) V_L = 120 \times \frac{37.7}{314.23}$$

$$V_L = 120 \times 0.11998$$

$$\underline{\underline{V_L = 14.3976 \text{ V}}}$$

(2)

$$b) F_{res} = \frac{1}{2\pi\sqrt{LC}}$$

$$F_{res} = \frac{1}{2\pi\sqrt{100 \times 10^{-3} \times 100 \times 10^{-6}}}$$

$$F_{res} = \frac{1}{2\pi\sqrt{1 \times 10^{-3}}}$$

$$F_{res} = \frac{1}{2\pi \times 3.162 \times 10^{-3}}$$

$$\underline{\underline{F_{res} = 0.020 \text{ Hz}}}$$

(2)

$$f_{\text{req}} = 0.020$$

$$c) X_C = \frac{1}{2\pi \times 0.020 \times 100 \times 10^{-6}}$$

$$X_C = 1.2566 \times 10^{-5} \Omega$$

$$X_L = 2\pi \times 0.020 \times 100 \times 10^{-3}$$

$$X_L = 0.012566 \Omega$$

$$I = V/R$$

$$I = 120 \times$$

$$X_C = 1.2566 \times 10^{-5} \Omega$$

$$Z = R + (X_L - X_C)$$

$$Z = 250 + (0.012566 - 1.2566 \times 10^{-5})$$

$$Z = 250.013 \Omega$$

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

$$I = \frac{120}{250.013}$$

$$I = 0.48 \text{ A}$$

$$\underline{\underline{I \text{ at resonant freq} = 480 \text{ mA}}}$$