



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE	: FLD 10102
SUBJECT TITLE	: ELECTRONIC DEVICES
LEVEL	: DIPLOMA
TIME / DURATION	: 4.00pm – 6.00pm (2 HOURS)
DATE	: 05 MAY 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
 2. This question paper is printed on both sides of the paper.
 3. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This questions paper consists of **TWO (2)** sections. Section A and B. Answer **ALL** questions in section A. For sections B, answer **TWO (2)** questions only.
 6. Answer all questions in English.
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THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

- (a) Draw an **ideal** and **practical** pn-junction diode characteristic curve. (4 marks)
- (b) List two types of regulation using zener diode. (2 marks)
- (c) A circuit shown in Figure 1 has a current of 5mA and diode's forward voltage, $V_F = 0.7V$. Determine R. (5 marks)

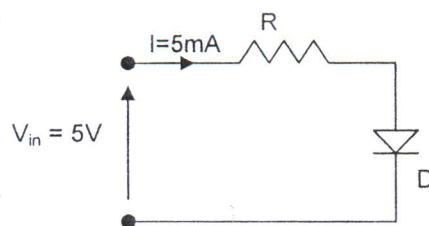


Figure 1

- (d) Determine the value of current (I) for the circuit shown in Figure 2 using the ideal diode model. Then recalculate the value using the practical diode model. Assume silicon diode. (9 marks)

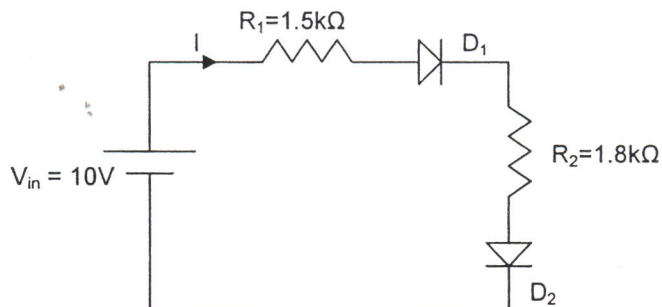


Figure 2

Question 2

The primary voltage, V_1 of the transformer in Figure 3 is $120V_{RMS}$ and $R_L = 10\Omega$. Considering practical silicon diodes, determine:

- i. The turns ratio $N_1 : N_2$, if the average current (I_{Lavg}) in the load resistor is equal to 1.5A. (10 marks)
- ii. The power dissipated in R_L under the conditions of (i). (4 marks)
- iii. Explain the operation of the circuit. (6 marks)

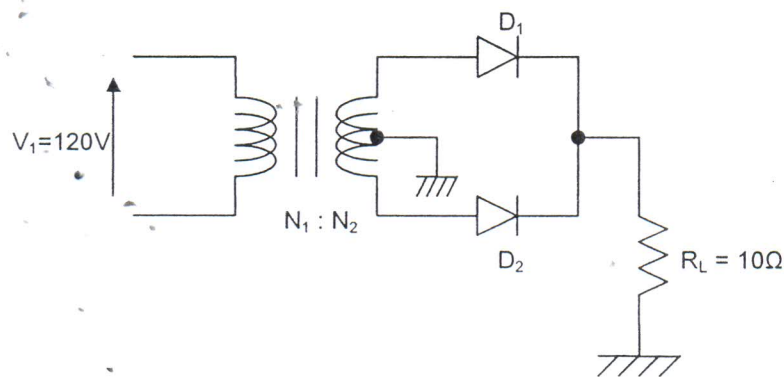


Figure 3

Question 3

- (a) Draw the symbols of PNP and NPN transistor. Show their terminals and currents with direction.

(4 marks)

- (b) A high sensor water module in Figure 4 below uses a silicon bipolar junction transistor to make a relay $12V_{dc}$ energize and function. The operation of the circuit is as follows: When sensor detects water, switch is closed and the transistor will 'ON'. The relay then will be energized. Given $\beta = 60$, determine I_B , I_C , I_E , V_{BE} , V_{CE} and V_{CB} .

(16 marks)

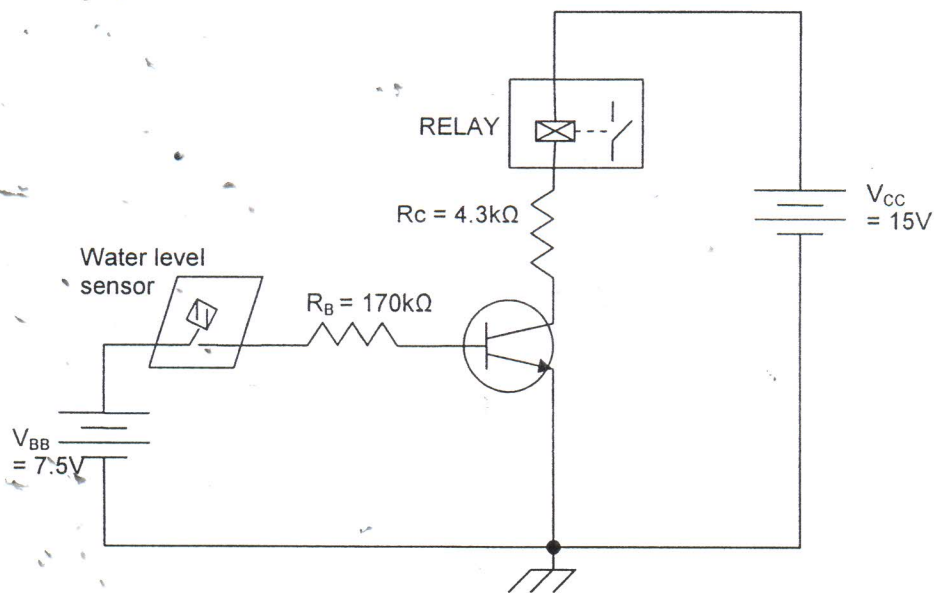
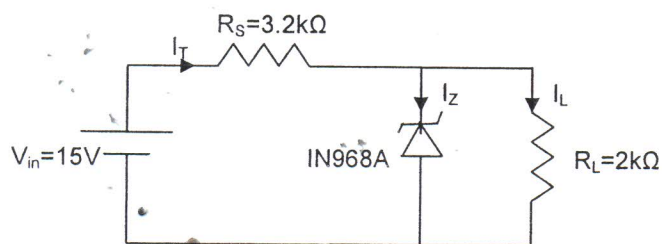


Figure 4

SECTION B (Total: 40 marks)**INSTRUCTION: Answer TWO (2) questions only.****Question 1**

- (a) By referring to the zener voltage regulator circuit shown in Figure 5, calculate I_Z .
(Consider ideal zener diode).

(16 marks)



IN968A Parameters:

$$V_Z = 3.7V$$

$$I_{ZK} = 0.2mA$$

$$I_{ZM} = 15mA$$

Figure 5

- (b) Determine whether zener diode IN968A used in circuit in Figure 5 can maintain its regulation. Give your reasons for your answer.

(4 marks)

Question 2

(a) By referring to the Figure 6 below, answer the following questions:

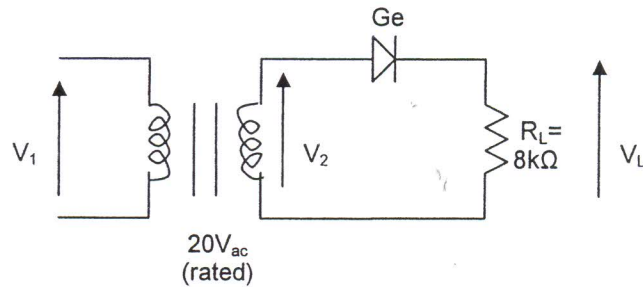


Figure 6

- i. Explain the operation of the above rectifier circuit. (6 marks)
 - ii. Sketch the waveform of V_2 and V_L . (4 marks)
 - iii. Calculate average load voltage (V_{Lavg}). (2 marks)
- (b) A primary voltage (V_1) of a positive full-wave bridge rectifier is $110V_{RMS}$. The transformer used has a turns ratio $N_1 : N_2 = 3 : 1$ and a load resistance of $20k\Omega$. (Diodes are germanium type). Calculate:
- i. the peak load voltage (V_L) (4 marks)
 - ii. the average load voltage (V_{Lavg}) (2 marks)
 - iii. the average load current (I_{Lavg}) (2 marks)

Question 3

- (a) By considering ideal zener diode, determine and sketch the output voltage for each zener limiting circuit in Figure 7 below. (Zener diodes are silicon type).

(10 marks)

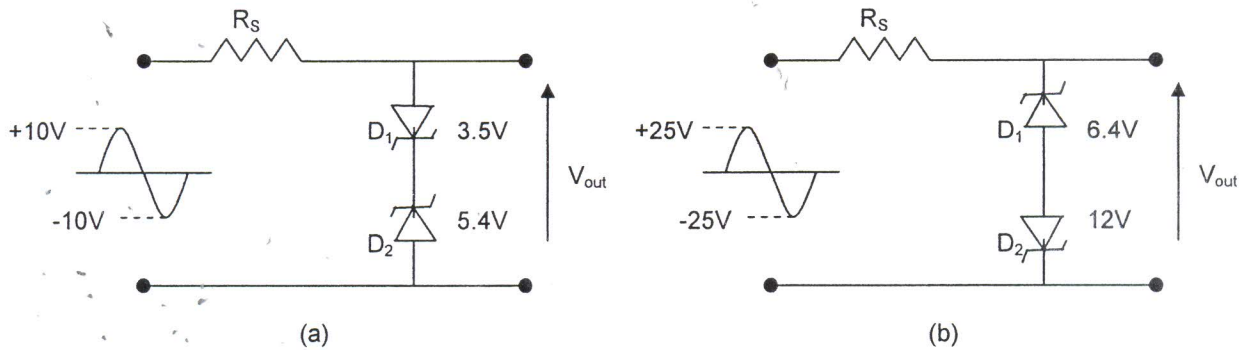


Figure 7

- (b) Draw I-V characteristic curve of transistor and label its operating region. (5 marks)
- (c) Determine the alpha rating for the transistor shown in Figure 8. Then determine the value of I_C using both the alpha rating and the beta rating of the transistor. (5 marks)

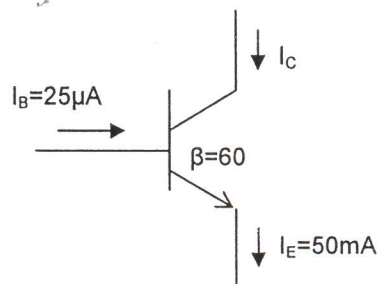


Figure 8

END OF QUESTION PAPER