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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2013 SESSION

SUBJECT CODE	:	**FLD 10102**
SUBJECT TITLE	:	**ELECTRONIC DEVICES**
LEVEL	:	**DIPLOMA**
TIME / DURATION	:	**2.5 HOURS**
DATE	:	

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. **Answers should be written in blue or black ink except for sketching, graphic and illustration.**
5. **This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.**
6. **Answer all questions in English.**

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a) Define the doping process.

(2 marks)

(b) Describe the difference between n-type and p-type semiconductor materials.

(3 marks)

(c) Determine the current that will flow in the circuit of **Figure 1** below which uses two oppositely-connected diodes in parallel. Both diodes are germanium type.

(5 marks)

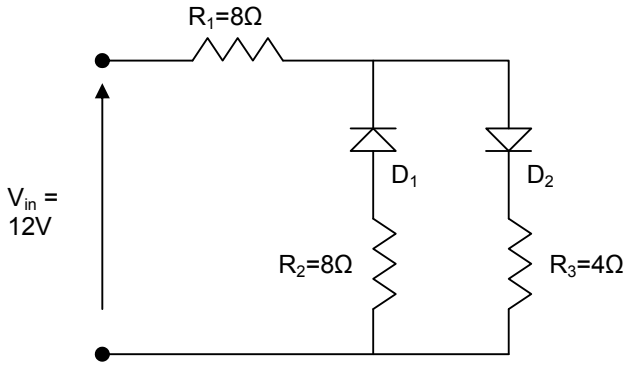


Figure 1

(d) Draw I-V characteristic curve of transistor and indicate on the curve all operating regions for transistor.

(5 marks)

(e) Determine the alpha rating for the transistor as shown in **Figure 2**. Then determine the value of I_C using both the alpha rating and the beta rating of the transistor.

(5 marks)

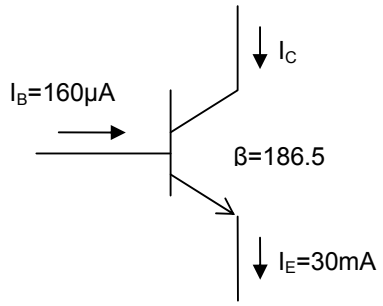


Figure 2

Question 2

(a) By referring to **Figure 3** below, answer the following questions:

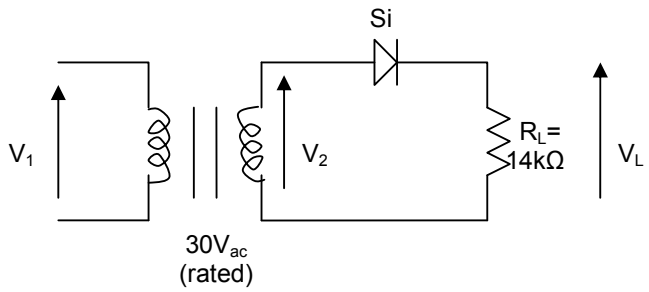


Figure 3

(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}).

(4 marks)

(b) A primary voltage (V_1) of a transformer for a positive full-wave bridge rectifier is $150V_{RMS}$. The transformer used has a turns ratio $N_1 : N_2 = 4 : 1$ and a load resistance of 12kΩ. (Diodes are silicon type). Calculate:

(i) the peak load voltage (V_{Lp})

(2 marks)

(ii) the average load voltage (V_{Lavg})

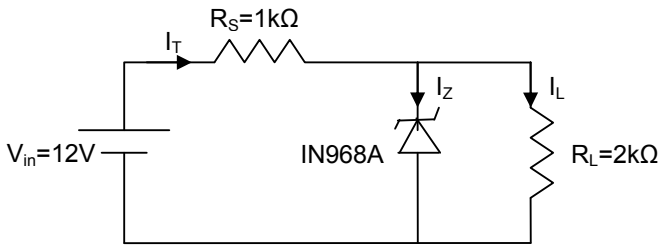
(2 marks)

(iii) the average load current (I_{Lavg})

(2 marks)

Question 3

(a) By referring to the zener voltage regulator circuit as shown in **Figure 4**, calculate I_Z. (Consider ideal zener diode). (16 marks)



IN968A Parameters:
V_Z = 4.2V
I_{ZK} = 0.2mA
I_{ZM} = 50mA

Figure 4

(b) Determine whether zener diode IN968A used in circuit in **Figure 4** can maintain its regulation. Give your reason for your answer.

(4 marks)

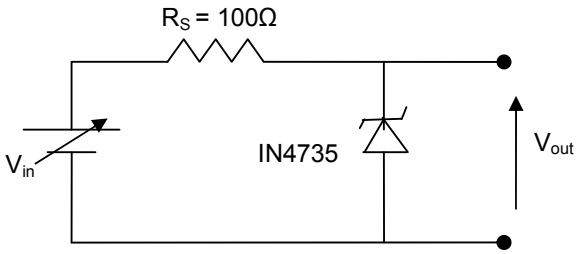
SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions only.

Question 4

Determine the minimum and maximum input voltages that can be regulated by the zener diode in **Figure 5** below. (Consider ideal zener diode).

(20 marks)



IN4735 Parameters:
V_Z = 10V at I_{ZT} = 40mA
I_{ZK} = 3mA
P_D = 1W at T_L = 50˚C

Figure 5

Question 5

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

(4 marks)

(b) A high sensor water module in **Figure 6** below uses a 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 $\beta = 100$, determine I_B, I_C, I_E, V_{BE}, V_{CE} and V_{CB}. (Transistor based on silicon)

(16 marks)

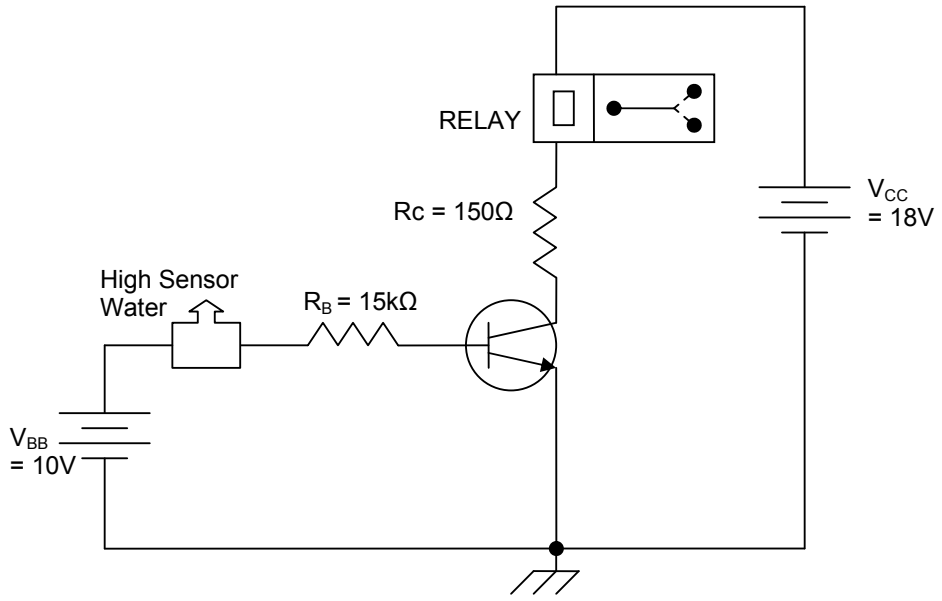


Figure 6

Question 6

(a) (i) An opamp's IC can be identified by 7 character ID code. Distinguish the code by referring to **Table 1** below.

(4 marks)

Prefix	Designator	Suffix
TL	741C	P

Table 1

(ii) There are two supply voltages for op-amp, labeled $+V_S$ and $-V_S$. Draw the three ways showing how the supply voltage can be connected.

(6 marks)

(b) Refer to **Figure 7** and answer the following questions.

(i) Identify the amplifier. (1 mark)

(ii) Determine the closed-loop gain, A_{CL}. (3 marks)

(iii) Calculate the output voltage, V_{out}. (2 marks)

(iv) Sketch the input voltage, V_{in} and output voltage, V_{out} on the same curve. (4 marks)

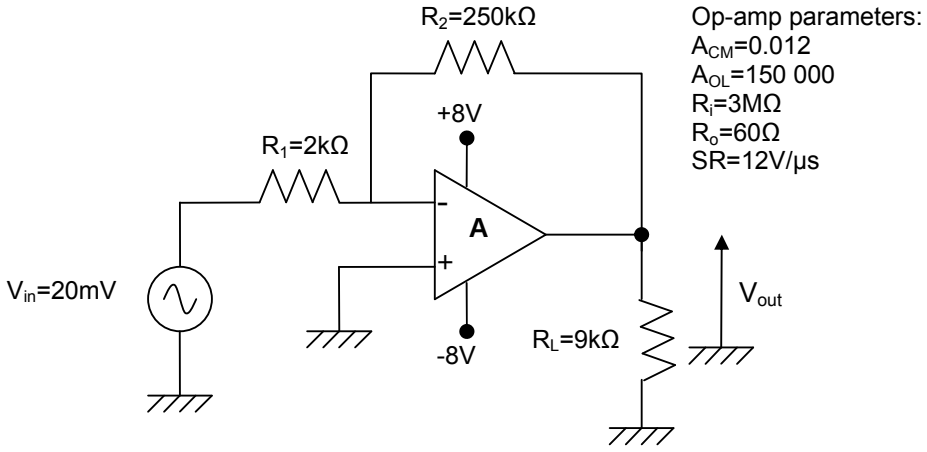


Figure 7

END OF QUESTION PAPER