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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

SEPTEMBER 2014 SESSION

SUBJECT CODE	:	**FLB12013 / FLB12023**
SUBJECT TITLE	:	**ANALOG ELECTRONICS**
LEVEL	:	**BACHELOR**
TIME / DURATION	:	**3.30 PM – 6.00 PM (2.5 HOURS)**
DATE	:	**08 JANUARY 2015**

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 three (3) questions only.**
6. **Answer all questions in English.**
7. **Do not open the question paper until instructed to do so**

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a) Define:

(i) Intrinsic material (2 marks)

(ii) Extrinsic material (2 marks)

(b) Briefly explain the formation of:

(i) N-type materials (3 marks)

(ii) P-type materials (3 marks)

(c) Refer to **Figure 1**, determine:

(i) The current, I (4 marks)

(ii) The output voltage at V_{o1} and V_{o2} (6 marks)

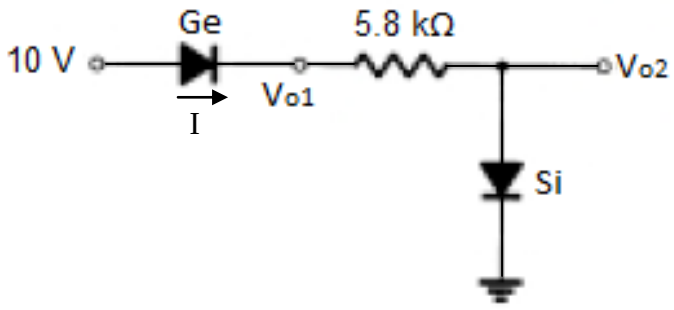

Figure 1

Question 2

(a) **Figure 2** shows a half-wave rectifier with a silicon diode.

(i) Determine the output voltage, V_o (3 marks)

(ii) Sketch the output waveform (3 marks)

(iii) Calculate the average output voltage, V_{dc} (3 marks)

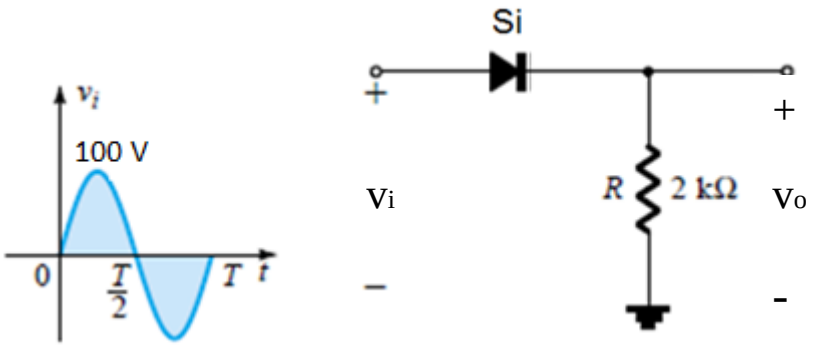

Figure 2

(b) **Figure 3** shows a full-wave rectifier with silicon diodes.

(i) Determine the output voltage, V_o (5 marks)

(ii) Sketch the output waveform (3 marks)

(iii) Calculate the average output voltage, V_{dc} (3 marks)

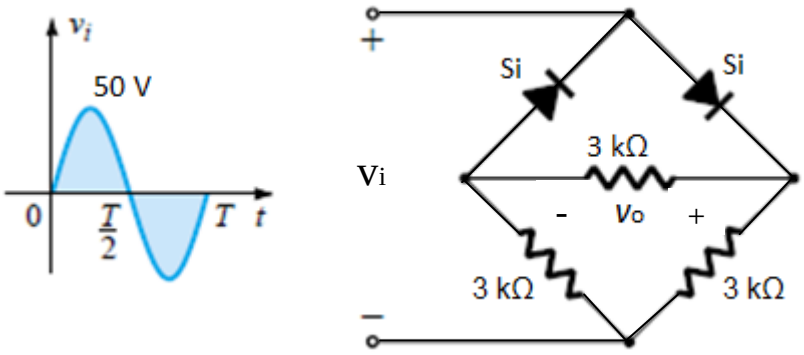

Figure 3

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only.
Please use the answer booklet provided.

Question 3

Figure 4 shows a regulator network of a Zener diode.

(a) Determine V_{imin}, I_L, I_{Rmax} and V_{imax} that will maintain the Zener diode in the "on" state (14 marks)

(b) Calculate the maximum wattage rating of the Zener diode (3 marks)

(c) Sketch a plot of V_L versus V_i. (3 marks)

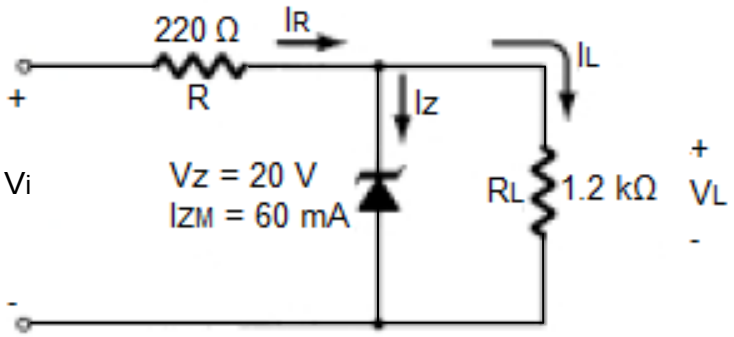

Figure 4

Question 4

(a) List two (2) basic types of transistor. (2 marks)

(b) Refer to fixed-bias configuration in **Figure 5**, given R_C = 2.2 kΩ, I_B = 20 μA, I_E = 4 mA and V_{CE} = 7.2 V. Determine:

(i) V_{BE} and V_E (3 marks)

(ii) Ic (3 marks)

(iii) V_{CC} (3 marks)

(iv) β (3 marks)

(v) R_B (3 marks)

(vi) I_{Csat} (3 marks)

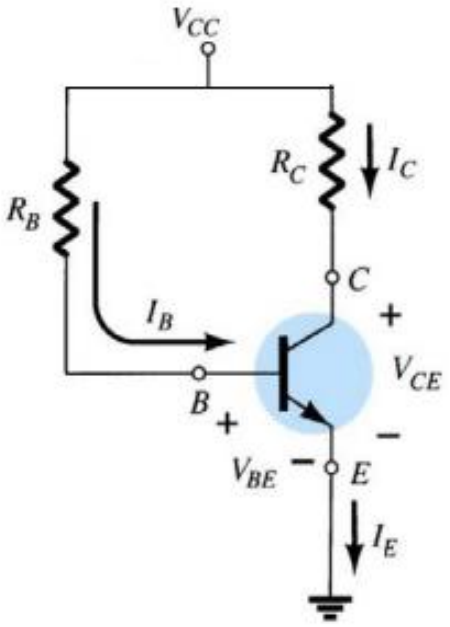

Figure 5

Question 5

Refer to the emitter-stabilized bias circuit in **Figure 6**, calculate:

(a) I_E (3 marks)

(b) β (3 marks)

(c) Vcc (5 marks)

(d) R_B (5 marks)

(e) I_{Csat} (4 marks)

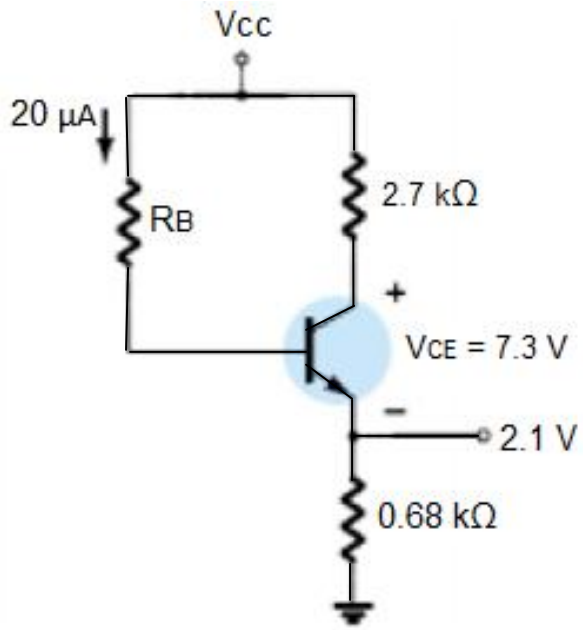

Figure 6

Question 6

(a) Calculate V_o for the circuit shown in **Figure 7**: (10 marks)

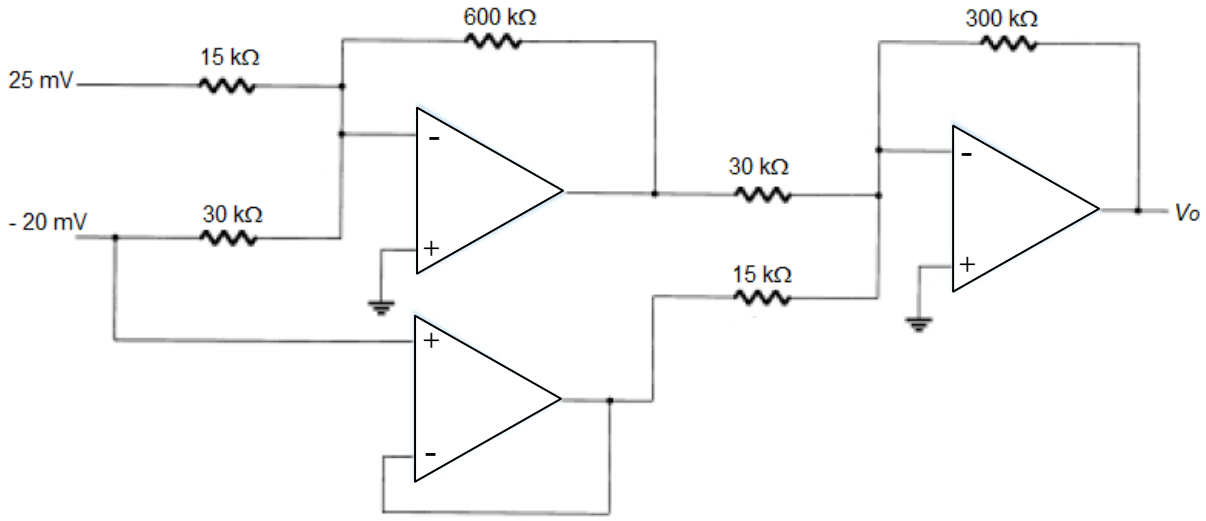

Figure 7

(b) Design a first order low pass filter which enable to filter the signal above 1.5 kHz with a voltage gain of 6. Given R_G = 10 kΩ and capacitor, C_1 = 0.05 µF.

(10 marks)

END OF QUESTION PAPER