



**UNIVERSITI KUALA LUMPUR**  
**Malaysia France Institute**

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**FINAL EXAMINATION**  
**JULY 2010 SESSION**

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**SUBJECT CODE** : FLD 10102  
**SUBJECT TITLE** : ELECTRONIC DEVICES  
**LEVEL** : DIPLOMA  
**TIME / DURATION** : 8.00pm – 10.00pm  
( 2 HOURS )  
**DATE** : 10 NOVEMBER 2010

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**INSTRUCTIONS TO CANDIDATES**

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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.
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THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a) Give 2 most commonly used semiconductor elements.

(2 marks)

(b) Define bias in electronics term.

(2 marks)

(c) Determine the total current ( $I_T$ ) in the circuit of Figure 1 which uses four diodes in series and parallel. All diodes are germanium type.

(6 marks)

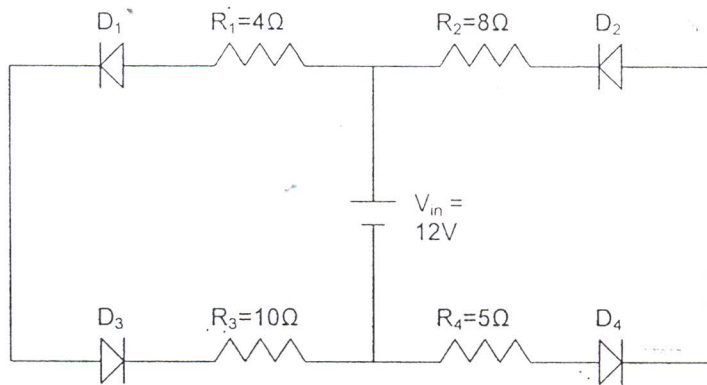


Figure 1

(d) Determine  $I$ ,  $V_{Si}$ ,  $V_1$  and  $V_{out}$  for the diode circuit in Figure 2 below.

(10 marks)

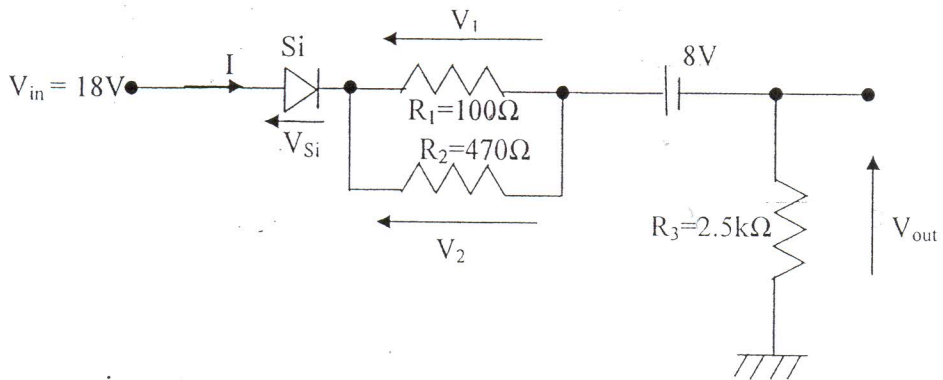


Figure 2

**Question 2**

(a) A basic dc power supply can be broken down into 4 circuit groups. Name the circuits. (4 marks)

(b) A positive full-wave center-tapped rectifier is fed by a 30V<sub>ac</sub> transformer with the load of 10kΩ. (Diodes are silicon type). As such;

i. Draw the rectifier circuit and explain the operation of the circuit. (6 marks)

ii. Sketch the waveform of  $V_2$  (secondary voltage for transformer) and load voltage,  $V_L$ . (4 marks)

iii. Calculate the value of peak load voltage ( $V_{L(pk)}$ ), average load voltage ( $V_{Lavg}$ ) and average load current ( $I_{Lavg}$ ). (6 marks)

Question 3

Figure 3 shows a clipper circuit using two ideal silicon zener diodes. By referring to the zener data sheet in Figure 4, determine:

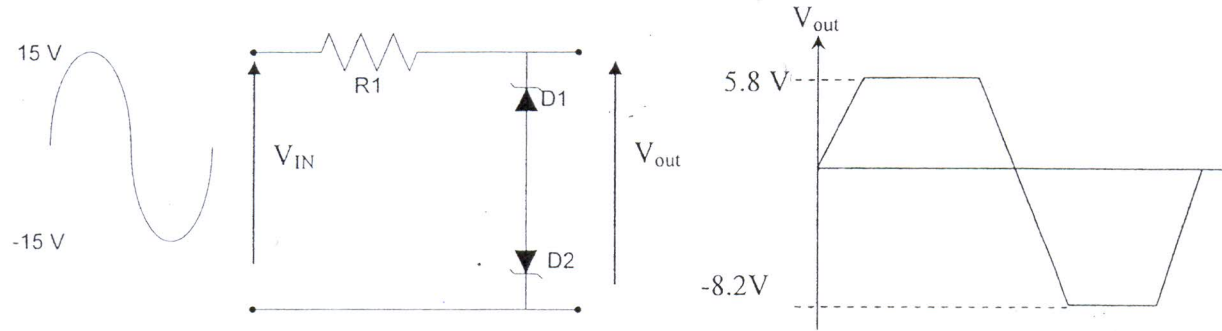


Figure 3

- (a) The **device type number** of zener diode D1 and D2 and support your answer with calculation. (6 marks)
  
- (b) The parameters value and unit for answer (a)
  - i) maximum DC Power Dissipation ( $P_D$ ) (2 marks)
  - ii) nominal Zener Voltage ( $V_Z$ ) (2 marks)
  - iii) zener Test Current ( $I_{ZT}$ ) (2 marks)
  - iv) zener Knee Current ( $I_{ZK}$ ) (2 marks)
  - v) Maximum Zener Test Impedance ( $Z_{ZT}$ ) (2 marks)
  - vi) Maximum Zener Knee Impedance ( $Z_{ZK}$ ) (2 marks)
  - vii) Power Derating Factor (DF) (2 marks)



January 2005

# 1N4728A - 1N4764A

Zeners

1N4728A - 1N4764A Zeners



DO-41 Glass case  
COLOR BAND DENOTES CATHODE

### Absolute Maximum Ratings \* $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$P_D$	Power Dissipation @ $T_L \leq 50^\circ\text{C}$ , Lead Length = 3/8"	1.0	W
	Derate above $50^\circ\text{C}$	6.67	mW/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-65 to +200	$^\circ\text{C}$

\* These ratings are limiting values above which the serviceability of the diode may be impaired.

### Electrical Characteristics $T_a = 25^\circ\text{C}$ unless otherwise noted

Device	$V_Z$ (V) @ $I_Z$ (Note 1)			Test Current $I_Z$ (mA)	Max. Zener Impedance			Leakage Current	
	Min.	Typ.	Max.		$Z_Z$ @ $I_Z$ ( $\Omega$ )	$Z_{ZK}$ @ $I_{ZK}$ ( $\Omega$ )	$I_{ZK}$ (mA)	$I_R$ ( $\mu\text{A}$ )	$V_R$ (V)
1N4728A	3.315	3.3	3.465	76	10	400	1	100	1
1N4729A	3.42	3.6	3.78	69	10	400	1	100	1
1N4730A	3.705	3.9	4.095	64	9	400	1	50	1
1N4731A	4.085	4.3	4.515	58	9	400	1	10	1
1N4732A	4.465	4.7	4.935	53	8	500	1	10	1
1N4733A	4.845	5.1	5.355	49	7	550	1	10	1
1N4734A	5.32	5.6	5.88	45	5	600	1	10	2
1N4735A	5.89	6.2	6.51	41	2	700	1	10	3
1N4736A	6.46	6.8	7.14	37	3.5	700	1	10	4
1N4737A	7.125	7.5	7.875	34	4	700	0.5	10	5
1N4738A	7.79	8.2	8.61	31	4.5	700	0.5	10	6
1N4739A	8.645	9.1	9.555	28	5	700	0.5	10	7
1N4740A	9.5	10	10.5	25	7	700	0.25	10	7.6
1N4741A	10.45	11	11.55	23	8	700	0.25	5	8.4
1N4742A	11.4	12	12.6	21	9	700	0.25	5	9.1
1N4743A	12.35	13	13.65	19	10	700	0.25	5	9.9
1N4744A	14.25	15	15.75	17	14	700	0.25	5	11.4
1N4745A	15.2	16	16.8	15.5	16	700	0.25	5	12.2
1N4746A	17.1	18	18.9	14	20	750	0.25	5	13.7
1N4747A	19	20	21	12.5	22	750	0.25	5	15.2

Figure 4

## SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions only.

## Question 4

The primary voltage on the transformer in Figure 5 below is  $110V_{RMS}$  and  $N_1 : N_2 = 6 : 3$ .  
Diode's forward voltage is  $0.7V$ .

- (a) Determine the value of  $R_L$  if the average current ( $I_{ave} = 0.6A$ ) in  $R_L$ .

(15 marks)

- (b) Calculate the power dissipated ( $P_D$ ) in  $R_L$  under the conditions of (i).

(5 marks)

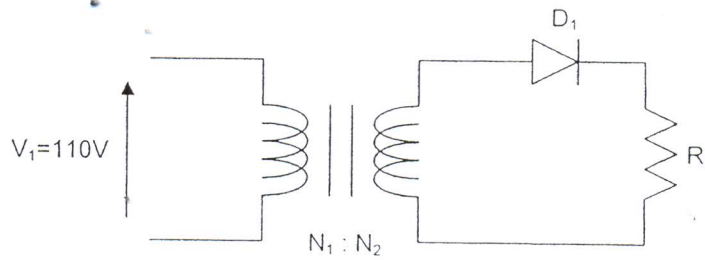


Figure 5

Question 5

Figure 6 shows a voltage regulator circuit with a variable load. By considering ideal zener diode, determine:

(a) The minimum allowable value of  $R_L$ .

(10 marks)

(b) The zener current,  $I_Z$  if  $R_L = 10k\Omega$ .

(10 marks)

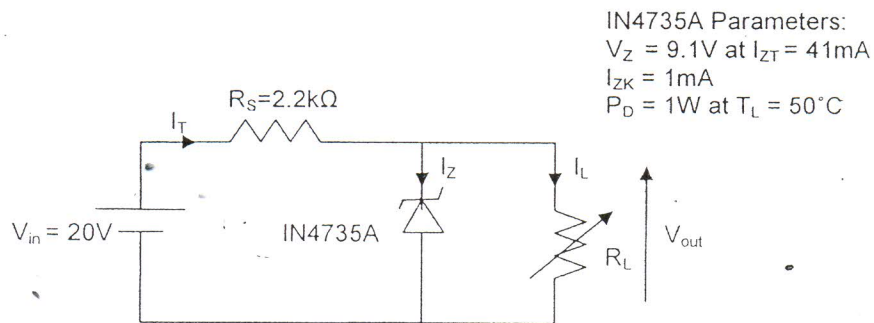


Figure 6

**Question 6**

Determine  $I_B$ ,  $I_C$ ,  $I_E$ ,  $V_{BE}$ ,  $V_{CE}$  and  $V_{CB}$  in the circuit in Figure 7. The transistor used is based on silicon and has a rating of  $\beta = 180$ .

(20 marks)

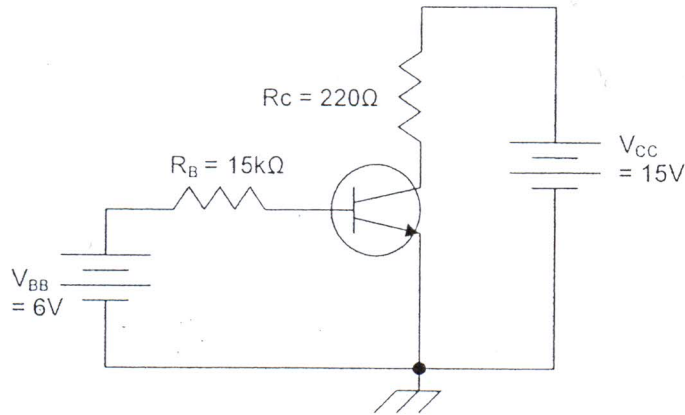


Figure 7

END OF QUESTION PAPER