

FIJI NATIONAL UNIVERSITY
College of Engineering Science and Technology

School of Electrical and Electronic Engineering

TRADE DIPLOMA IN ELECTRICAL ENGINEERING

FINAL EXAMINATION –Semester 2, 2013

EEE435 ANALOG ELECTRONICS1

Date:

Time: 2 hrs

Total Marks: 100

1. You are allowed 10 minutes extra time for reading during which you are not to write.
2. Begin each **Question on fresh page** and use both side of the page.
3. Write registration number at the top of each extra sheet.
4. Insert all written answer sheet in a correct sequence and secure with string.
5. Tie in any rough working papers at the end of the answer sheet but labeled clearly as rough working.
6. Write clearly the number of questions attempted.
7. Section A is objective type and Section B is a Descriptive type.
8. Answer all question in Section A and B and attempt **any Six of the eight questions** from Section C.
9. No Programmable calculators are permitted into the examination room.

SECTION A: OBJECTIVE TYPE QUESTIONS (30 marks)

Select the correct answer for 15 objective questions given below. Each carry equal marks.

1. The diode _____.
 - A. is the simplest of semiconductor devices
 - B. remain open during reverse bias condition
 - C. is a two-terminal semiconductor device
 - D. All of the above

2. What does a high resistance reading in both forward- and reverse-bias directions indicate in diodes?
 - A. A good diode
 - B. An open diode
 - C. A shorted diode
 - D. A defective ohmmeter

3. What is the state of an ideal diode in the region of nonconduction?
 - A. An open circuit
 - B. A short circuit
 - C. Unpredictable
 - D. Undefined

4. How many orbiting electrons does the germanium atom have?
 - A. 4
 - B. 14
 - C. 32
 - D. 10

5. What unit is used to represent the level of a diode forward current I_F ?
 - A. Pico amps
 - B. Nano amps
 - C. Micro amps
 - D. Milli amps

6. The diffused impurities with _____ valence electrons are called donor atoms.
 - A. 4
 - B. 3
 - C. 5
 - D. 0

7. Which of the following instruments can check the condition of a semiconductor diode?
 - A. Digital display meter (DDM)
 - B. Multimeter
 - C. Curve tracer
 - D. All of the above

8. Which of the following is an atom composed of?

- A. Electrons
- B. Protons
- C. Neutrons
- D. All of the above

9. Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.

- A. dc
- B. ac
- C. ripple
- D. None

10. The 7805 regulator IC provides _____.

- A. 5 V
- B. -5 V
- C. 12 V
- D. -12 V

11. Calculate the voltage regulation of a power supply having $V_{NL} = 50$ V and $V_{FL} = 48$ V.

- A. 4.17 %
- B. 5.2%
- C. 6.2%
- D. 7.1%

12. IC units provide regulation of _____.

- A. a fixed positive voltage
- B. a fixed negative voltage
- C. an adjustably set voltage
- D. All of the above

13. A complete power supply has a _____.

- A. rectifier
- B. filter
- C. voltage regulator
- D. All of the above

14. If the value of the full-load voltage is the same as the no-load voltage, the voltage regulation calculated is _____.

- A. 0%
- B. a negative percentage
- C. a positive percentage
- D. None of the above

15. The series 7900 ICs are _____.

- A. positive voltage regulators
- B. negative voltage regulators
- C. both positive and negative voltage regulators
- D. adjustable-set voltage regulators

SECTION B: Select the following sentences as a TRUE or FALSE: (10 marks)

1. In common emitter mode the output is obtained between the Base- collector junction.
2. Current gain $\beta = [\alpha/1-\alpha]$ for a transistor in CE mode.
3. JFET is also known as Unipolar transistor.
4. N-Channel JFET has P-type semiconductor as Gate.
5. FET is a current operated device.
6. BJT and FET are used for amplification of electrical signal.
7. Zener diode is always connected in forward bias condition for voltage regulation.
8. MOSFET is an insulated gate FET.
9. N-Channel JFET uses both type of charge carriers i.e. electrons and holes for the conduction.
10. Diode is used for wave shaping.

SECTION C: Answer any SIX questions.**(Total 60 marks)****Q 1. Semiconductor- Diode**

(a) What is the difference between extrinsic and intrinsic semiconductor? Give example of each.(3 marks)

(b) List four main parameters of PN junction diode. (2 marks)

(c) Assume that the voltage across a forward biased silicon diode is 0.7 V and that across a forward biased germanium diode is 0.3 V. (5 marks)

(i) If D1 and D2 are both silicon diodes in fig 1, find the current I in the circuit.

(ii) Repeat, if D1 and D2 are of different semiconductor material as D1 is silicon and D2 is germanium in fig 1, then find the current in the circuit.

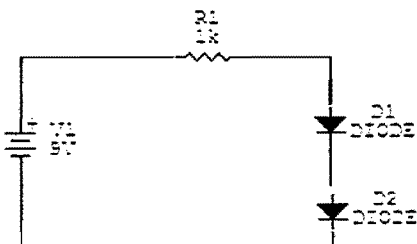


Fig.1

Q2: Zener diode

(a) For the circuit in fig 2. Find the following values :

Find: $I_S (=I_L + I_Z)$, I_L (load current) and $I_{Z\max}$ and $I_{Z\min}$ (zener current).

Where R1 is series(S) resistor and R2 is load(L) resistor.

(6 marks)

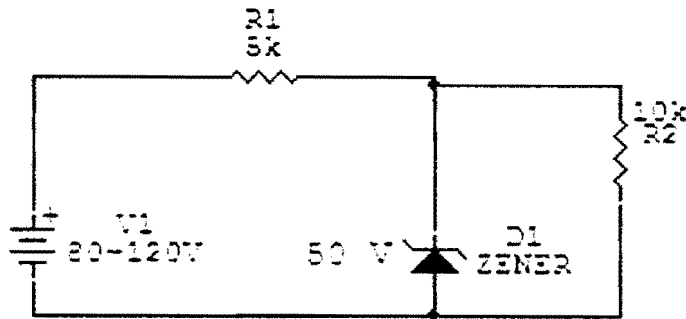


Fig 2

- (b) Using a labeled I-V characteristic curve for zener diode show Zener voltage and Zener current. (4 marks)

Q3: Half Wave rectifier:

- (a) Define Peak Inverse Voltage of a diode in rectifier circuit. What is the significance of PIV? (2 marks)

- (b) A half rectifier uses a diode with a forward resistance of 100 ohms. If the input voltage of ac voltage is of 220V (rms) and load resistance is of 2k.

Determine: (i) I_{max}

(ii) I_{dc}

(iii) I_{rms}

iv) find the value of PIV.

(8 marks)

Q4: Fullwave rectifier:

- (a) Draw the circuit diagram for full wave Bridge rectifier and label its resistance and diode.

(5marks)

- (b) Explain its working using waveform diagram.

(5marks)

Q5: Power supply:

- (a) What is a Power supply? Draw the block diagram to show a complete Power supply components.

(5marks)

- (b) State advantage of a full wave rectifier over half wave rectifier?

(5marks)

Q6: BJT

- a) Name the three configuration in which transistor can be used.

(2marks)

- b) In the given figure 3, if the current gain β is 100 then calculate the values of I_E , I_B , I_C and V_{BE} is 0.7 V. Find collector base voltage V_{CB} . (8 marks)

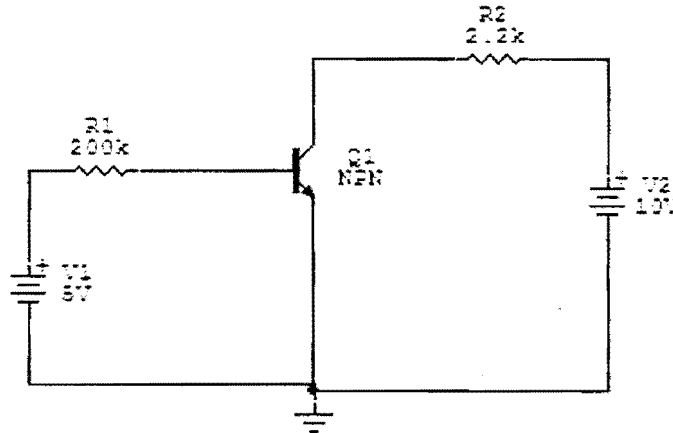


Fig. 3

Q7: FET

- Draw the labeled symbol for N-Channel FET and P-Channel FET. (2marks)
- Sketch the drain characteristic curve of a junction FET for $V_{GS} = 0$. Show clearly the ohmic region, pinch off region, breakdown region. (6 marks)
- What is MOSFET? (2 marks)

Q8: OP-AMP

- What is OP-AMP? Give its symbol with input and output terminals. (4 marks)
- Draw the circuit diagram for OP-AMP in following mode: Inverting, Non inverting and Unity follower. And mention there voltage gain clearly. (6 marks)

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