

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2131006

Date: 02/06/2017

Subject Name: Electronic Devices and Circuits

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

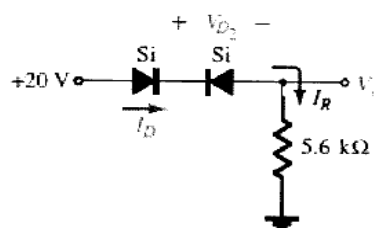
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	Choose the most appropriate alternative.	14
1	Holes act like a) Atoms b) Crystals c) Negative Charges d) Positive charges.	
2	When comparing the energy gap of germanium and silicon atoms, a silicon atom's energy gap is a) About the same b) Lower c) Higher d) Unpredictable.	
3	When the diode current is large, the bias is a) Forward b) Inverse c) Poor d) Reverse.	
4	What is the PIV across each diode of a bridge rectifier with a secondary voltage of 20 V rms? a) 14.1 V b) 20 V c) 28.3 V d) 34 V	
5	The Varactor is usually a) Forward biased b) Reverse biased c) Unbiased d) Operated in break down region	
6	In a <i>pnp</i> transistor, the major carriers in the emitter are a) Free electrons b) Holes c) Neither d) Both	

- 7 The beta of a transistor is the ratio of the
 - a) Collector current to emitter current
 - b) Collector current to base current
 - c) Base current to collector current
 - d) Emitter current to collector current
- 8 The major advantage of a phototransistor as compared to a photodiode is its
 - a) Response to higher frequency
 - b) AC operation
 - c) Increased sensitivity
 - d) Durability
- 9 A swamped amplifier uses
 - a) Base bias
 - b) Positive feedback
 - c) Negative feedback
 - d) A grounded emitter
- 10 The emitter is at ac ground in a
 - a) CB stage
 - b) CC stage
 - c) CE stage
 - d) none of these
- 11 The dc current gain of an emitter follower is
 - a) 0
 - b) ≈ 1
 - c) β_{dc}
 - d) Dependant on r'_e
- 12 The amplifier configuration that produces a 180° phase shift is the
 - a) CB
 - b) CC
 - c) CE
 - d) All of the above
- 13 Heat sinks reduce the
 - a) Transistor power
 - b) Ambient temperature
 - c) Collector Current
 - d) Junction Temperature
- 14 CMOS devices use
 - a) Bipolar transistors
 - b) Complementary E-MOSFETs
 - c) Class A operation
 - d) DMOS devices

Q.2 (a)

03



For the circuit above determine I_D , V_{D2} and V_0 .

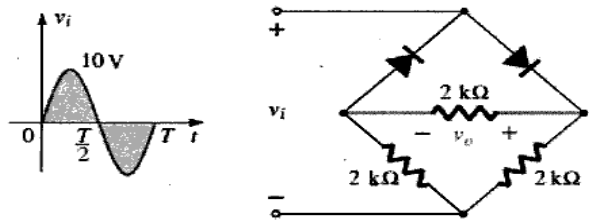
- (b)

Draw a diode curve and label all significant points and areas.

04
- (c)

Determine the output waveform for the network of given figure and calculate the output dc level and the required PIV of each diode.

07

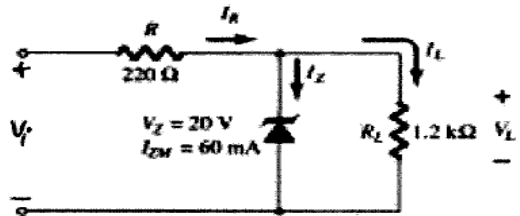


OR

- (c)

Determine the range of values of V_i that will maintain the Zener diode of Figure below in the 'on' state.

07



- Q.3

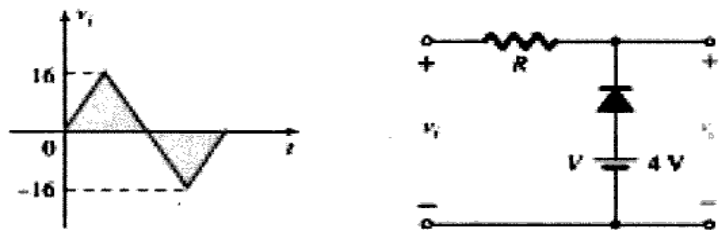
(a)

Compare half wave, full wave, and bridge rectifier over following criteria.
a) DC output when diode is not ideal,
b) ripple frequency, and
c) PIV.

03
- (b)

Determine V_0 for the network of given figure below. Take $(V_T = 0.7)$

04



- (c)

Explain the diode application as voltage multipliers.

07

OR

- Q.3

(a)

A transistor has an emitter current of 10mA and a collector current of 9.95mA. What is the Base current? What is the current Gain?

03
- (b)

Explain the working of emitter-biased LED driver.

04
- (c)

Explain the four regions of operation of a bipolar junction transistor with collector curve.

07
- Q.4

(a)

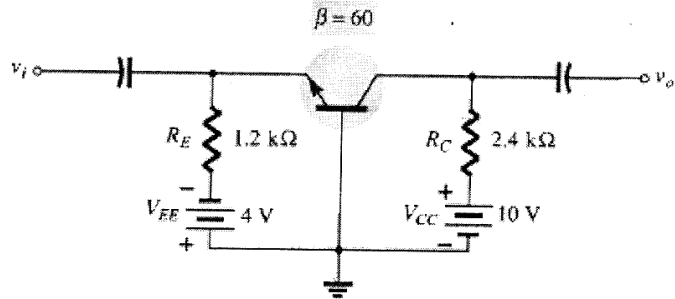
List any three optoelectronics devices with their applications.

03
- (b)

Define the positive and negative feedback in amplifier with their

04

- applications.
- (c) Determine the currents I_E and I_B and the voltages V_{CE} and V_{CB} for the common-base configuration of Figure given below. 07



OR

- Q.4** (a) Draw the Darlington pair transistor and list its advantages.. 03
- (b) Classify the power amplifier accordingly 04
- a) Class of operation
- b) Types of coupling
- c) Range of frequency
- d) signal levels
- (c) Describe the application of JFET as analog switch. 07
- Q.5** (a) Draw a diagram of an emitter follower and describe its advantages. 03
- (b) If the class C amplifier of figure below has an output power of 11mW and an input power of $50 \mu W$, What is the power gain? 04
- What is the maximum ac output power of the circuit?
- (c) Describe how E-MOSFETs are used as digital switches. 07

OR

- Q.5** (a) List the power FET application. 03
- (b) Define the four type of negative feedback. 04
- (c) Draw the basic constructional figure of depletion-mode and enhancement-mode MOSFET. Show the suitable semiconductor material that can be used for different regions. 07
