

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2131006

Date: 17/11/2017

Subject Name: Electronic Devices and Circuits

Time: 10:30 AM to 01:00 PM

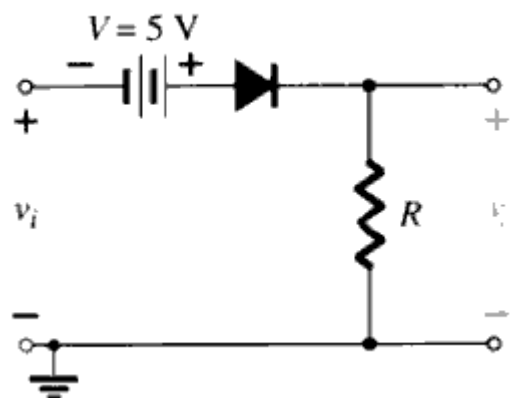
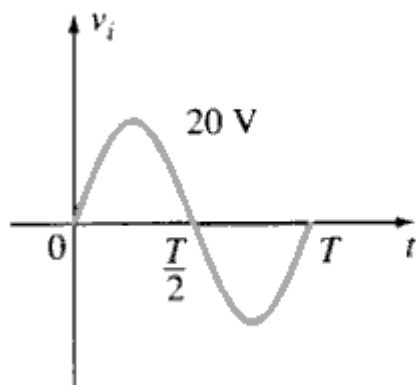
Total Marks: 70

Instructions:

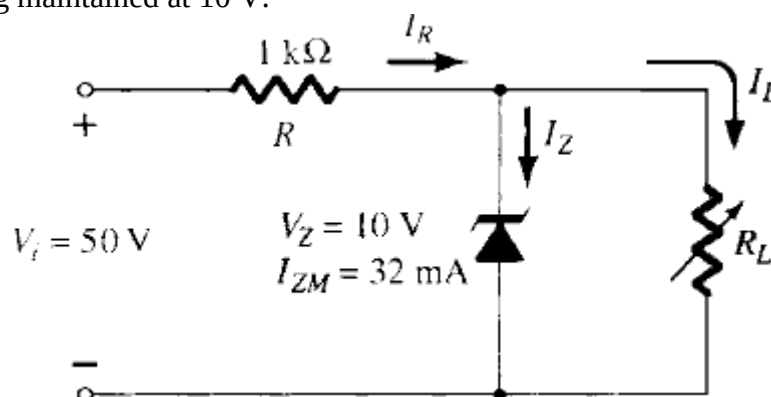
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- (a) List the two types of carriers and name the type of impurity that causes each to be a majority carrier. **03**
- (b) With help of voltage doubler circuit, describe the action of voltage multipliers. **04**
- (c) A full-wave bridge rectifier with a 120 Vrms sinusoidal input has a load resistor of 1 k Ω . **07**
- i) If Silicon diodes are employed, what is the dc voltage available at the load?
 - ii) Determine the required PIV rating of each diode.
 - iii) Find the maximum current through each diode during conduction.
 - iv) What is the required power rating of each diode?
- Q.2**
- (a) Draw a diode curve and label all significant points and areas. **03**
- (b) Determine the output waveform for the sinusoidal input of figure given below. **04**



- (c) For the network given below, determine the range of R_L and I_L that will result in V_{RL} being maintained at 10 V. **07**



OR

- (c) A transistor is connected in common emitter configuration in which collector supply is 8V and the voltage drop across resistance R_C connected in the collector circuit is 0.5V. The value of $R_C=800\Omega$, if $\alpha=0.96$ determine: 07
- i) Collector emitter voltage
 - ii) Base Current.

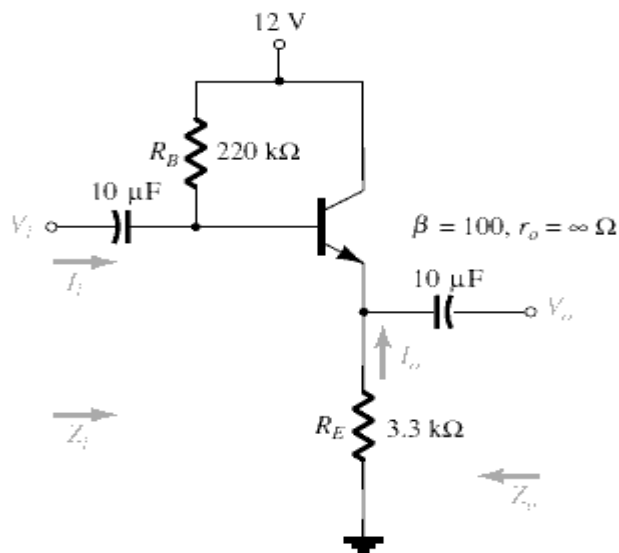
- Q.3 (a) Drive the relation between dc alpha and dc beta for bipolar junction transistor. 03
- (b) Draw T-model and π -model of transistor. 04
- (c) Draw an emitter bias circuit and explain why it works well in amplifying circuits. 07

OR

- Q.3 (a) State the advantages of a Darlington transistor. 03
- (b) Draw Swamped amplifier circuit and list three of its advantages. 04
- (c) Calculate the divider current, base voltage, emitter voltage, emitter current, collector voltage, and collector-emitter voltage for an npn VDB circuit. 07

- Q.4 (a) Draw the symbol and list the application of 03
- i) Step-recovery diode,
 - ii) Tunnel diode,
 - iii) PIN diode.
- (b) Classify the power amplifier based on classes of operation, type of coupling and frequency range. 04
- (c) For the emitter-follower network of given figure below determine: 07

- i) r_e ,
- ii) Z_i
- iii) Z_o
- iv) A_i



OR

- Q.4 (a) Differentiate between current shunt feedback and voltage shunt feedback. 03
- (b) Explain the JFET application as analog switch. 04
- (c) Draw diagrams that show common biasing arrangement of JFET and discuss Drain curves. 07
- Q.5 (a) What is the use of Heat Sinks in power amplifier? 03
- (b) Calculate the gain of a negative feedback amplifier with an internal gain $A_v=75$ and feedback fraction $m_v= 1/15$. What will be the gain if A_v doubles? 04
- (c) Explain the characteristics and operation of enhancement-mode MOSFETs. 07

OR

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|------------|------------|---|-----------|
| Q.5 | (a) | List the advantages of Negative feedback. | 03 |
| | (b) | Explain the role of coupling capacitor and bypass capacitor in amplifier circuit. | 04 |
| | (c) | Draw a Schematic of a typical CMOS digital switching circuit and explain its operation. | 07 |
