

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012295

Roll No.

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**B.TECH.**

**Regular Theory Examination (Odd Sem - I), 2016-17**

**BASIC ELECTRONICS.**

**Paper-I**

*Time : 3 Hours*

*Max. Marks : 100*

**Section - A**

**1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)**

- a) Distinguish between avalanche and zener breakdown.
- b) Calculate the dynamic forward resistance of pn junction diode when applied voltage is 0.80 V at temperature of 43 degree Celsius and reverse saturation current is 8 microampere?

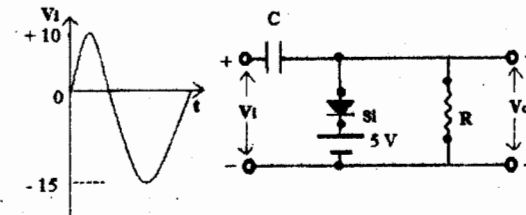
- c) Explain the principle of operation of LED.
- d) Derive the relationship between  $\alpha$  and  $\beta$ .
- e) The thickness of base is typically smaller than emitter and collector. Why?
- f) Explain FET as voltage variable resistor.
- g) An operation amplifier has differential gain of  $10^2$  and CMRR of 80 dB, input voltage are 100 microampere and 60 microampere. Determine output voltage.
- h) Write the characteristics of an ideal Op-Amp.
- i) State the advantages of digital instruments over analog instruments.
- j) Give advantages of FM over AM?

## Section - B

Attempt any five questions from this section

(5×10=50)

2. a) Explain the V-I characteristic of p-n junction diode. Draw well labelled characteristic.
- b) Draw the circuit and discuss the working of full wave bridge rectifier with suitable input-output waveform.
3. a) For the given clamper circuit shown in figure below determine the output voltage and also draw the waveform of output signal.



- b) Explain the V-I characteristic of tunnel diode.
4. a) Draw the circuit diagram of BJT in CE configuration. Draw output characteristic curves and indicate the different regions of operation.

- b) An n-p-n transistor with  $\beta = 98$  is operated in the CB configuration, if the emitter current is 2 mA and reverse saturation current is 12  $\mu\text{A}$ . What are the base and collector current?
5. a) Why is transistor biasing required? Describe collector to base biasing in CE n-p-n transistor circuit.
- b) Explain various current components in npn transistor with help of suitable diagram.
6. a) Draw the circuit and explain the drain characteristic for N-channel JFET.
- b) Describe the construction and basic connection of Depletion - MOSFET.
7. a) Draw the circuit diagram of an integrator using Op-Amp and explain its working.
- b) Design and draw an inverting amplifier using Op-Amp with a gain of  $-5$  and  $R_i = 10 \text{ K}\Omega$ .
8. a) Explain how unknown signal frequency is measured using CRO.

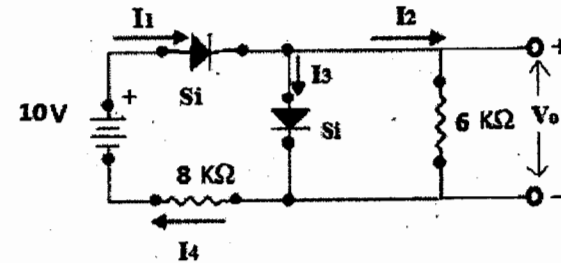
- b) Explain the basic principle of a digital multimeter.
9. Define Amplitude modulation. Derive the expression for AM modulated waveform. Define modulation index of AM.

## Section - C

Attempt any two questions from this section

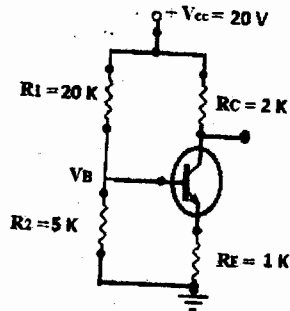
(2×15=30)

10. a) For the circuit shown in figure below determine  $I_1, I_2, I_3, I_4, V_o$ .



- b) Draw and discuss voltage tripler circuit.
- c) Explain principle of operation of LCD.

11. a) Discuss AC equivalent model of voltage divider biased amplifier in CE configuration.
- b) For the circuit shown below determine  $V_B$ ,  $I_C$ ,  $V_C$ .  
Given that  $\beta = 80$ ,  $V_{BE} = 0.7$  V.



- c) Explain the formation of depletion region in JFET.
12. a) Draw and derive relationship for Op-Amp as closed loop non-inverting amplifier circuit.
- b) A 500 W carrier is modulated to a depth of 60%. Calculate the total power in amplitude modulated wave.
- c) If a FM wave is represented by the equation :

$$V = 8\sin(6 \times 10^8 + 3\sin 2000t)$$

Calculate :

- i) Carrier frequency
- ii) Modulating frequency
- iii) Modulation index.

