REC-101

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

Paper ID : 2012295   Roll No. ☐☐☐☐☐☐☐☐☐

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?

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c) Explain the principle of operation of LED.

d) Derive the relationship between α and β.

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 $10^{\wedge}2$ 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?

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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.
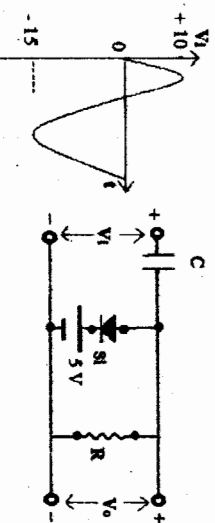
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b) An n-p-n transistor with $\beta = 98$ is operated in the CB configuration, if the emitter current is 2 mA and reverse saturation current is 12 μA. What are the base and collector current?

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 $R_1 = 10$ KΩ.

8. a) Explain how unknown signal frequency is measured using CRO.
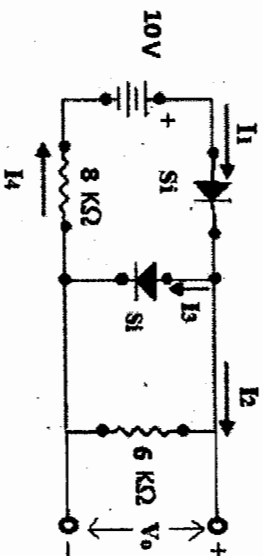
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b) Explain the basic principle of a digital multimeter.

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_0

b) Draw and discuss voltage tripler circuit.

c) Explain principle of operation of LCD.

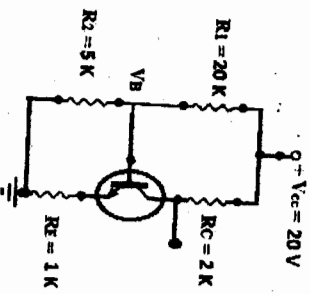101/11/2016/47560   (5)   [P.T.O.

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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.


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R1 = 20 K       VB
                        o→ VCC = 20 V
R2 = 5 K
                        RC = 2 K

RE = 1 K
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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.

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