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B.TECH
(SEM 1) THEORY EXAMINATION 2017-18
BASIC ELECTRONICS

Time: 3 Hours**Total Marks: 70****Notes:**

1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt all questions in brief.**2 x 7 = 14**

- A. An operational amplifier has a differential gain of 103 and 100, input voltages are $120\mu\text{V}$ and $80\mu\text{V}$, and determine output voltage.
- B. What is ripple factor? What is the value of RF for half wave and full wave rectifier?
- C. Why BJT is called current controlled device?
- D. State the advantage of digital instruments over analog instruments.
- E. List the ideal characteristics of op-amp.
- F. What is modulation index? Draw the amplitude spectrum of AM wave.
- G. What is trans-conductance in FET? What is the relationship between g_m and g_{mo} ?

SECTION B

2. Attempt any three of the following:**7 x 3 = 21****A. Explain the following with clear diagram:-**

- i) Full wave voltage doubler.
- ii) Bridge rectifier.

B. Draw the common emitter circuit and sketch the input and output characteristics. Also explain active region, cutoff region and saturation region by indicating them on the characteristic curve.

C. Explain how Op-Amp can be used as

- i) Integrator ii) Inverting Summer and iii) Voltage Follower

D. Explain with block diagram how DMM can measure AC and DC signals and various other electrical parameters?

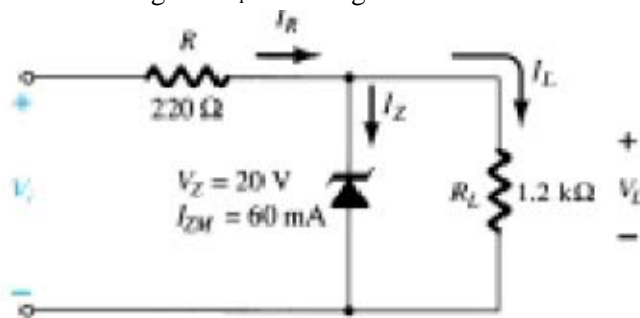
E. Draw the block diagram of communication system. Calculate the percentage power saving when one side band and carrier is suppressed in an AM signal with modulation index equal to 1.

3. Attempt any *one* part of the following:

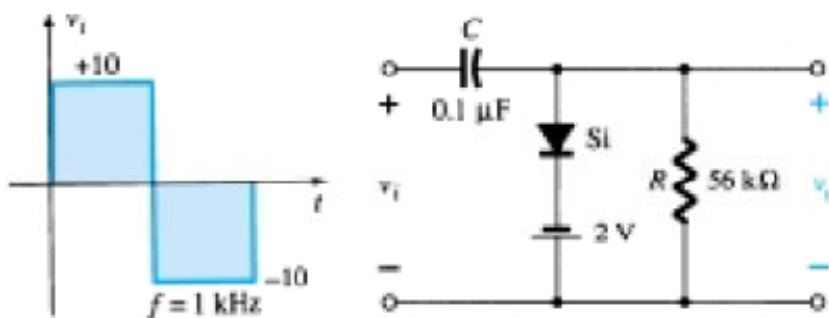
7 x 1 = 7

1)

A) Determine the range of V_i for the fig. that will maintain the zener diode in “on” state?



B) Determine v_o for the circuit shown in fig



2) Explain the following:-

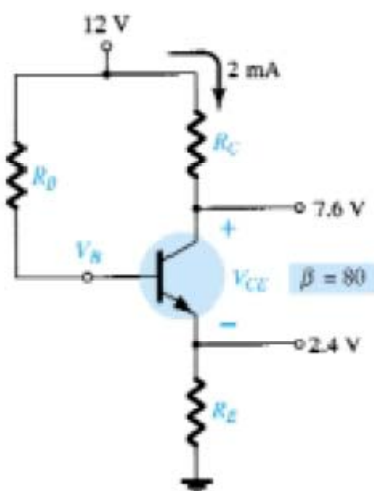
- Tunnel Diode
- Transition capacitance and diffusion capacitance

4. Attempt any *one* part of the following:

7 x 1 = 7

1) For the network of fig.

- Determine R_B and R_E
- Find V_B , V_{CE} , and V_{BC}



2)

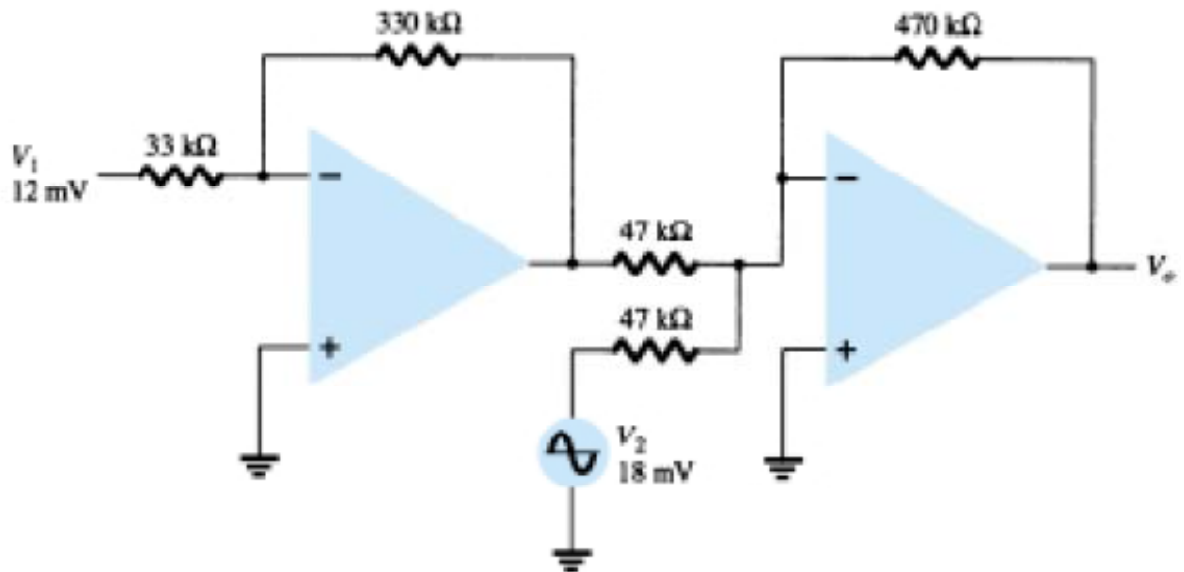
- Explain the construction and working of N-channel JFET. Draw the drain characteristic and transfer curve.
- Explain the construction and working of depletion MOSFET.

5. Attempt any one part of the following:

7 x 1 = 7

1)

A) Calculate the output voltage V_o of the circuit.



B) Explain the following characteristics of an op-amp:-

- i) CMRR
- ii) slew rate

2) Derive an expression for voltage gain of inverting and non-inverting ideal operational amplifier configurations.

6. Attempt any one part of the following:

7 x 1 = 7

1) Draw and explain the block diagram of a ramp-type digital voltmeter (DVM).

2) A) Draw the general block diagram of CRO and explain each block.

B) A Lissajous pattern on an oscilloscope is stationary. It has 5 vertical tangent values and 6 horizontal tangent values. The frequency of horizontal input is 1800Hz. Determine the frequency of vertical input.

7. Attempt any one part of the following:

7 x 1 = 7

1) Define Amplitude Modulation. Derive the expression for AM modulated waveform. Define modulation index of AM.

2) A certain AM transmitter radiates 9 KW with the carrier unmodulated and 10.125 KW when the carrier is modulated. Calculate the modulation index. If another sine wave is simultaneously transmitted with the modulation index 0.4, determine the total radiated power.