UPTU Notes

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B.TECH
(SEM 2) THEORY EXAMINATION 2017-18
BASIC ELECTRONICS

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

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

A. Derive the relationship between α & β.
B. The reverse saturation current of a Si p-n junction diode is 10μA at 300K.Determine the forward bias voltage to be applied to obtain diode current of 100mA.
C. A Lissajous pattern on an oscilloscope is stationary and has 4 horizontal and 3 vertical tangencies. The horizontal frequency is 50 Hz, find vertical frequency.
D. Explain the principle of operation of LED.
E. Describe how FET can be used as voltage variable resistor?
F. Sketch the circuit of op-amp as an integrator and differentiator.
G. The unmodulated r.m.s current of an AM wave is 8.93A and it increase to 11.25A with modulation. Determine the modulation index.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

A. Explain the operation of full wave bridge rectifier with the help of a circuit diagram. Also sketch the input and output waveforms. Define its PIV. Also derive its ripple factor and rectification efficiency.

B. Define clipper circuit. Sketch the output waveform for the circuit shown below for given input (Fig 1).

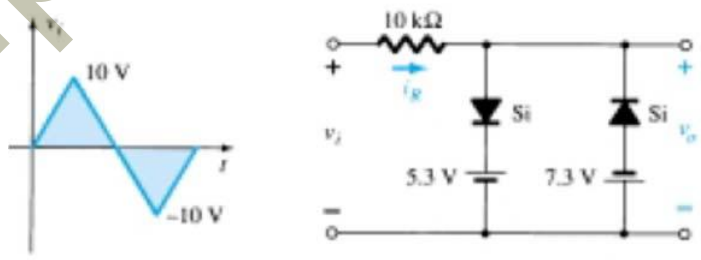

Fig. 1

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C. Draw the basic structure of CB BJT and explain its principle of operation with in neat diagram along with its input and output characteristics.

D. Explain CRO with the help of diagram. How can we measure phase and frequency using CRO?

E. Define op-amp with the help of block diagram. Also draw its equivalent circuit. List the ideal characteristics of op-amp.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

A (i) Find the range of R_L and I_L that will maintain a constant output voltage of 10V (Fig. 2)

(ii) Also determine the maximum wattage rating of the Zener diode for given circuit.

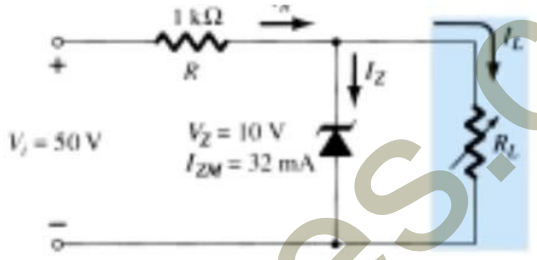

Fig. 2

B. Discuss the construction and working of tunnel diode. Also sketch its I-V characteristics and explain.

4. Attempt any *one* part of the following: 7 x 1 = 7

A. For the voltage divider network shown below (Fig. 3), Given I_{DSS}=10mA,Vp=-3.5 V, determine V_G, I_{DQ}, V_{GSQ}, V_D,V_S & V_{DSQ}

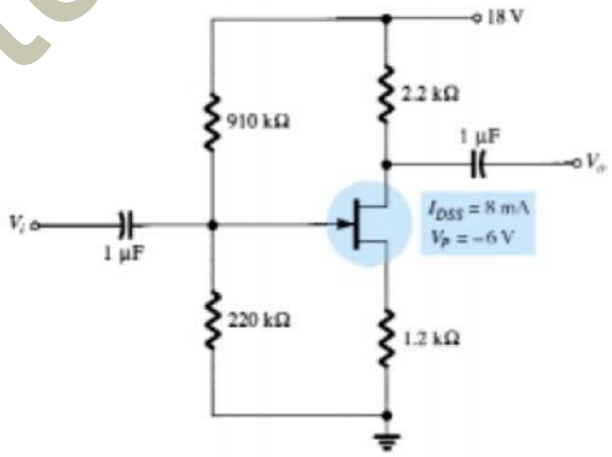

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Fig. 3

B. Determine the output waveform for the given network (Fig. 4). Determine the output dc level and compute PIV for each diode.

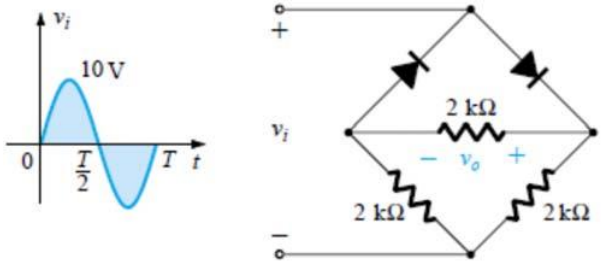

Fig. 4

5. Attempt any *one* part of the following: 7 x 1 = 7

A. Draw the circuit of n-channel depletion type MOSFET & explain its operation. Also draw its drain & transfer characteristics.

B. i. Explain the operation of op-amp as integrator.
ii Determine the output voltage for given op-amp circuit(Fig. 5).

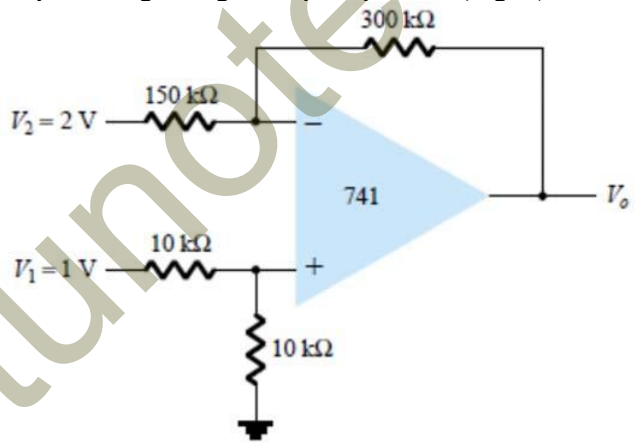

Fig. 5

6. Attempt any *one* part of the following: 7 x 1 = 7

A. (i) Define Amplitude Modulation. Derive an expression for amplitude modulated wave.

(ii)A sinusoidal carrier of 1MHz and amplitude 100V is amplitude modulated by a sinusoidal modulating signal of frequency 5 KHz providing 50% modulation. Calculate the frequency and amplitude of USB and LSB.

B. (i) Sketch the output for given clamper circuit with shown input (Fig. 6).

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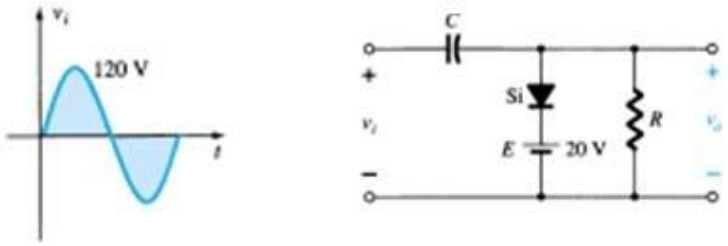

Fig.6

(ii)Sketch v_0 for given circuit configuration (Fig. 7):

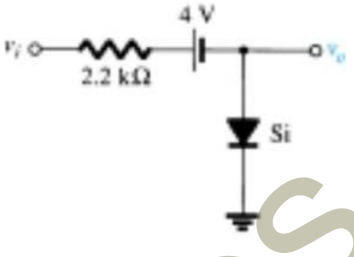

Fig. 7

7. Attempt any *one* part of the following: 7 x 1 = 7

A. Using suitable diagram explain the basic principle of digital multimeter (DMM).Also list its applications.

B. (i) Explain Double Sideband Suppressed Carrier (DSB- SC) Techniques.

(ii)Compare Amplitude Modulation (AM), Frequency Modulation (FM) and Phase Modulation (PM).

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