

Roll No. to be filled in your Answer Book

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B.Tech

SEMESTER-III, UTU EXAMINATION, 2013-14

ELECTRONIC DEVICES AND CIRCUIT

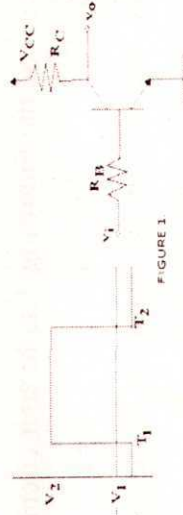
Time: 3 Hours]

[Total Marks: 100

Note:- Attempt All Questions. All Questions carry equal marks.

Q1. Attempt any four Questions of the following:- 4x5=20

- (a) The voltage shown in Fig.1 on the left is in applied to the circuit on the right. Sketch the output voltage as a function of time and explain how you get that particular output.



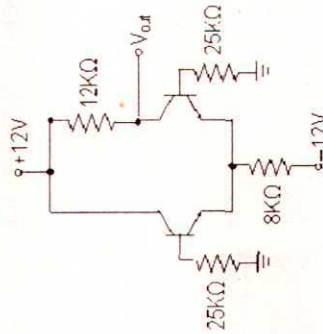
- (b) Distinguish ferromagnetic, ferrimagnetic and anti-ferromagnetic materials. Give an example of each class of material. Discuss the various uses of ferrites.
- (c) A Cascaded amplifier of 2 stages has $A_1 = 25$ and $A_2 = 10\text{db}$. If $V_i = 5\text{mv}$, find V_o and the overall gain of the cascaded system in dB.
- (d) Draw circuit diagram of Darlington amplifier. Give its main characteristics, merits and applications.

(1)

- (b) Explain why the conductivity of a pure semiconductor increases with temperature. When does an intrinsic semiconductor behave as an insulator? What is a hole in a semiconductor and how is it formed?
- (c) Write short notes on Hardening and tempering.

Q5. Attempt any two Questions of the following:- 2x10=20

- (a) In a phase shift oscillator, each resistor in RC network is 10 KW while each capacitor has a value of $0.01\mu\text{F}$. Find the operating frequency of the circuit. What is the phase shift produced by each RC section. Comment on results.
- (b) In the differential amplifier circuit shown below, the transistors have identical characteristics and their $\beta=100$. Determine the (i) output voltage (ii) the base currents and (iii) the base voltages taking into account the effect of the R_B and V_{BE} . Take $V_{BE}=0.7$ Volts



- (c) Draw the circuit of a monostable multivibrator using two transistors and explain its operation with reference to waveforms of pertinent node voltages in the circuit. Analyze the circuit to obtain an expression for the pulse period.

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- (e) Describe how oscillations are developed in a tank circuit.
- (f) A transistor has an alpha dc of 0.98 and a collector leakage current of one microampere. If the emitter current is one milliampere, find the magnitude of the collector and the base currents.
- Q2. Attempt any four Questions of the following:- 4x5=20**
- (a) Describe how conductivity and carrier mobility of a sample of semiconductor can be determined by subjecting it to Hall effect.
- (b) Discuss the variation in semiconductor parameters with temperature
- (c) Show that in an amplifier, the gain reduces if negative feedback is used.
- (d) Draw the circuit of a monostable multivibrator using two transistors. Use the following data in your circuit: $V_{ce} = 10V$, $V_{CE(sat)} = 0.2V$, $V_{BE(sat)} = 0.8V$, $\beta = 80$ for both the transistors. The resistor and capacitor connected to the base of Q_2 have values $R_B = 20k\Omega$ and $C = 0.1 \mu F$, respectively. Determine the monostable pulse width.
- (e) The gain of the amplifier is 100 with its bandwidth of 10 kHz. If 10% of negative feedback is applied in the basic amplifier, determine the feedback gain and new bandwidth of the amplifier.
- (f) Draw the circuit diagram of double tuned amplifier and explain briefly.

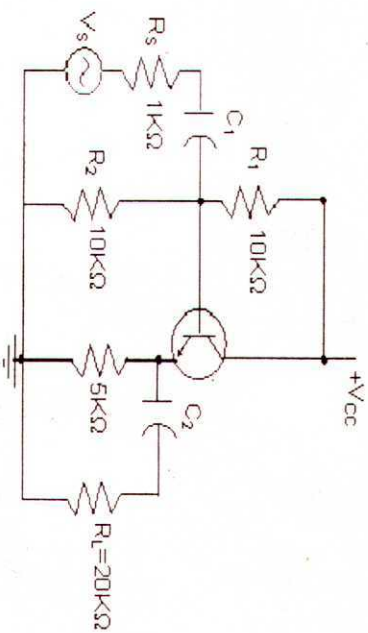
(2)

Q3. Attempt any two Questions of the following:- 2x10=20

- (a) (i) State any four advantages of negative feedback in amplifiers.
- (ii) In an amplifier with negative feedback, the gain of the basic amplifier is 100 and it employs a feedback factor of 0.02. If the input signal is 40mV, determine
- (A) voltage gain with feedback and
- (B) value of output voltage.
- (b) Draw the circuit of h-parameter equivalent of a CE amplifier with unbypassed emitter resistor. Derive an expression for
- (i) its input impedance and
- (ii) voltage gain, using the equivalent circuit.
- (c) Explain how the timer IC 555 can be operated as an astable multivibrator, using timing diagrams.

Q4. Attempt any two Questions of the following:- 2x10=20

- (a) For the amplifier circuit shown below, calculate R_i , A_v , A_v' .



The h-parameters for the transistor are: $h_{ie} = 1.2k\Omega$, $h_{re} = 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 25\mu A/V$.

(3)