

Con. 5024-08.

RC-6158

(3 Hours)

[Total Marks : 100]

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** from Question Nos. 2 to 7.
(3) Assume **suitable data** wherever **necessary**.
(4) Draw **neat** sketches/circuits to support your answer.
(5) **Figures** to the **right** indicates **full** marks.

1. Attempt any **four** :—

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- (a) Draw the circuit diagram of inverting schmitt trigger using op-amp and explain with waveforms. What is hysteresis voltage ?
(b) Explain how IC566 can be used as VCO.
(c) Explain the terms with reference to sample and Hold circuit;
(i) Hold step
(ii) Feed through rejection ratio
(iii) Aperture time
(iv) Aperture uncertainty
(v) Hold mode settling time.
(d) Differentiate between linear voltage regulator and switch mode voltage regulator.
(e) Draw the circuit using IC 566 as VCO to generate $f_o = 10$ kHz, supply voltage is 12 V, $R = 10$ k Ω and $C = 0.001$ μ f.
If f_o is required to be changed to 8 kHz, what is the change required in the control voltage ?

2. (a) Simulate the given expression using analog building blocks.

5

$$\frac{d^2 y}{dt^2} + 3.5 \frac{dy}{dt} + 0.63 y = u(t)$$

with initial conditions,

$$y(0) = -4.8$$

$$\left. \frac{dy}{dt} \right|_{t=0} = 2.5$$

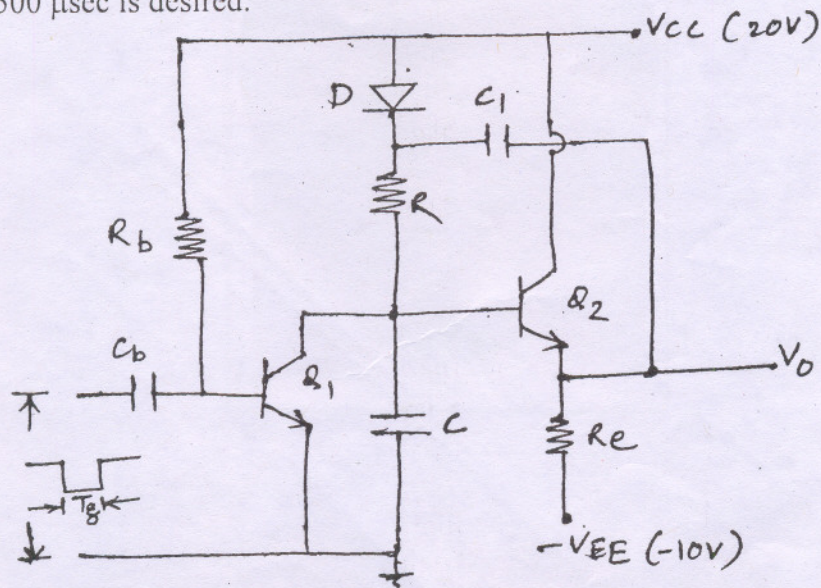
- (b) What are the limitations of conventional diode rectifier ? Draw neat ckt. dia. of full wave precision rectifier. Explain its working with the help of waveforms. 10
(c) Explain analog multiplier. 5

3. The circuit of figure has following parameters.

$V_{CC} = 20\text{ V}$, $V_{EE} = 10\text{ V}$, $R_e = 10\text{ k}\Omega$, $R = 5\text{ k}\Omega$, $T_g = 700\text{ }\mu\text{sec}$.
The transistor h-parameters are,

$$h_{fe} = 50, h_{ie} = 1.1\text{ k}\Omega, h_{re} = 2.5 \times 10^{-4}, h_{oe} = \frac{1}{40\text{ k}\Omega}$$

A 20 V sweep in 500 μsec is desired.



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- (a) Find Reasonable value of R_b
- (b) Calculate C
- (c) Calculate e_s , assuming C_1 arbitrarily large.
- (d) Calculate the retrace time T_r for C to discharge completely at the end of gating waveform.
- (e) Calculate the recovery time T_1 for C_1 to recharge completely.
4. (a) Draw functional diagram of astable multivibrator. Explain its operation with the help of waveforms. Also derive the expression for duty cycle. 12
- (b) In an astable multivibrator $R_A = 2.1 \text{ k}\Omega$, $R_B = 6.8 \text{ k}\Omega$ and $C = 0.01 \text{ }\mu\text{f}$. Calculate T_{ON} , T_{OFF} , free running frequency and duty cycle. 8
5. (a) Explain R-2 R ladder DAC, hence derive the equation for output voltage. 10
- (b) Draw neat circuit diagram of monostable multivibrator using op-amp. Explain its working with the help of waveforms of triggering signal, capacitor waveform and output waveform. 10
6. (a) State the features of IC723 voltage regulator. Explain foldback current limiting in detail. 10
- (b) Design a regulator using IC723 to give 5 V output upto 500 mA with input of 12 V dc. Use foldback current limiting. 10
7. Write short notes on (any **four**) :— 20
- (a) IC 555 as missing pulse detector
- (b) Electronic analog computer
- (c) Free running ramp generator using IC 555
- (d) Function generator IC 8038
- (e) Sample and Hold circuit.