

20/5/2022

QP:- 93332

Program No. & Name of the Examination Subject (Paper Code)	1T00934 // S.E. (Electronics & Computer Science Engineering) (SEM-IV) (Choice Base Credit Grading System) (R- 19) (C Scheme)
Time:	40722 // Electronic Circuits

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks -----20M
1.	Lower cut-off frequency ( $f_L$ ) depends upon :-
Option A:	Input coupling capacitor only
Option B:	Output coupling capacitor only
Option C:	Bypass coupling capacitor only
Option D:	Combination of input coupling capacitor, output coupling capacitor & bypass capacitor
2.	Differential configuration is preferred over single-ended configuration due to the fact that :-
Option A:	It offers higher voltage gain
Option B:	It eliminates effect of noise to a great extent
Option C:	It is extremely easy to design
Option D:	It can be constructed using fewer components
3.	The speed or rapidity with which output voltage of operational amplifier changes with respect to time is called as :-
Option A:	Slew rate
Option B:	Input offset voltage
Option C:	Output offset voltage
Option D:	Bandwidth
4.	A non-inverting amplifier has $R_2 = 100 \text{ k}\Omega$ & $R_1 = 1 \text{ k}\Omega$ . The closed loop voltage gain (with feedback) is:-
Option A:	10
Option B:	101
Option C:	1000
Option D:	1001
5.	What is the minimum required voltage gain to start oscillations in case of a 3 stage RC phase shift oscillator?
Option A:	10
Option B:	3

Option C:	29
Option D:	Depends on component values
6.	Assuming an operational amplifier is working on symmetrical DC power supplies of $+V_{CC}$ & $-V_{EE}$ , then as a comparator its output voltage will swing between:-
Option A:	0 V & $+V_{sat}$
Option B:	0 V & $-V_{sat}$
Option C:	$+V_{CC}$ & $-V_{EE}$
Option D:	$\pm V_{sat}$
7.	Which of these circuits are also called as transconductance amplifiers?
Option A:	Voltage to current converter
Option B:	Current to voltage converter
Option C:	Schmitt Trigger
Option D:	Differentiator
8.	What is the time period (T) of a monostable multivibrator using IC 555 Timer?
Option A:	$T = 0.5 \times R \times C$
Option B:	$T = 1.1 \times R \times C$
Option C:	$T = R \times C$
Option D:	$T = 10 \times R \times C$
9.	Which of the following couplings causes a shift of Q - point from one stage to other?
Option A:	RC coupling
Option B:	Impedance coupling
Option C:	Transformer coupling
Option D:	Direct (DC) coupling
10.	Which of these circuits is also called as regenerative comparator?
Option A:	Current to voltage converter
Option B:	Zero crossing detector (ZCD)
Option C:	Schmitt Trigger
Option D:	Differentiator
Q2	Solve any Two Questions out of the Three <span style="float: right;">10 marks each</span>
A	Draw the circuit diagrams along with input & output waveforms for an operational amplifier-based inverting & non-inverting zero crossing detector (ZCD). also draw the circuit diagram for three input Inverting Summing Amplifier and derive expression for the output.
B	Design a Wien Bridge oscillator to oscillate at an output frequency of $f_o = 500$ Hz. Assume that you have op-amp IC 741C with dual DC power supply of $V_{CC} = +15$ V & $V_{EE} = -15$ V thereby giving $V_{out} = \pm V_{sat} = \pm 13$ V. Draw the neat circuit diagram for the designed circuit.



Draw the functional block diagram of the IC 555 timer and explain the various features of the same.

Solve any Two Questions out of the Three

Draw the circuit diagram for the dual input balanced output (DIBO) differential amplifier configuration, Draw the AC equivalent circuits under differential & common mode of operation. Derive appropriate mathematical expressions for differential mode gain ( $A_d$ ), common mode gain ( $A_c$ ) & common mode rejection ratio (CMRR)

10 marks each

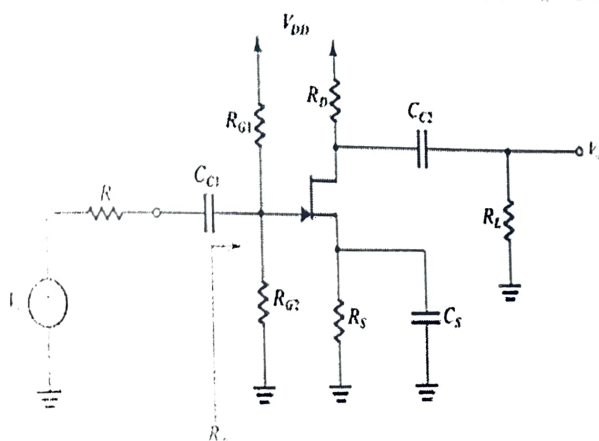
Design IC 555 timer based monostable multivibrator to generate a time delay of  $T = 500\text{ms}$  once triggered. Select standard component values. Assume  $V_{CC} = +9\text{V}$

Explain Barkhausen's criterion for sustained oscillations. Compare 3 stage RC phase shift oscillators & Wien Bridge oscillators on any five points.

Solve any Two Questions out of the Three

10 marks each

For the common source (CS) MOSFET small signal amplifier as shown in Fig. below, determine the lower cut-off frequency ( $f_L$ ).



Explain the operation of window detector or window comparator with neat sketch (diagram) & appropriate waveforms. Design an inverting Schmitt trigger for upper threshold voltage of  $V_{UTP} = +1\text{V}$  & lower threshold voltage of  $V_{LTP} = -1\text{V}$ . Assume that you have an op-amp IC 741C with dual DC power supply of  $V_{CC} = +15\text{V}$  & with  $V_{EE} = -15\text{V}$  thereby giving  $V_{out} = \pm V_{sat} = \pm 13\text{V}$ .

For IC 555 timer based astable multivibrator systematically derive all the relevant mathematical expressions for on time period ( $T_{ON}$ ), off time period ( $T_{OFF}$ ), total time period ( $T$ ), frequency ( $f_o$ ) & duty cycle ( $D$ )