INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, Chittoor

Sri City, Satyavedu Mandal, Chittoor district, Andhra Pradesh

Spring 2015: Mid Sem. Exam II Duration: 1:30 minutes

Course code: IEC 111 Subject: Basic Electronic Circuits Max marks: 50

Student name: **Branch:**

Roll No: **Invigilator signature:**

Instructions: 1) Answer all the questions

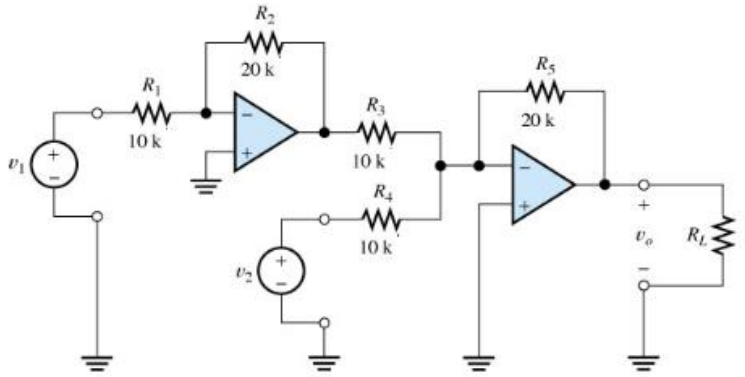
2) Attach question paper with answer sheet

LONG ANSWER QUESTIONS (5 MARKS EACH)

1) Draw the circuit diagram for wien bridge oscillator. Derive the expression for oscillation frequency and gain of the feedback network.

2)

a)Find V_o as a function of v_1 and v_2 for the given circuit

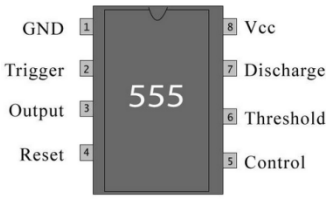


b) With the inputs V1=-50mV and V2= +50mV, difference amplifier has output Vo=1.0043V. With the input 5V commonly connected to opamp, the output is Vo=0.4153V. Determine the CMRR, expressed in dB.

SHORT ANSWER QUESTIONS (3 MARKS EACH)

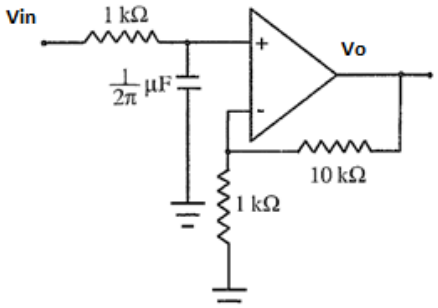
1) Draw the circuit diagram of a first order band pass filter. Draw the approx frequency response indicating bandwidth.

2) Draw the internal circuitry of a 555 timer connecting to the 8 pins that are indicated in the given schematic.

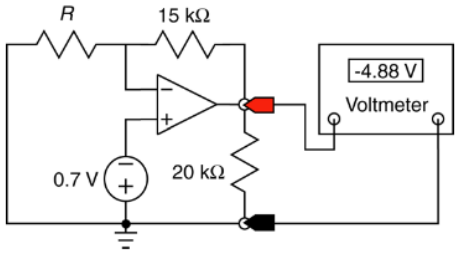


3) Classify Oscillators. what is Barkhausen criteria for oscillation?

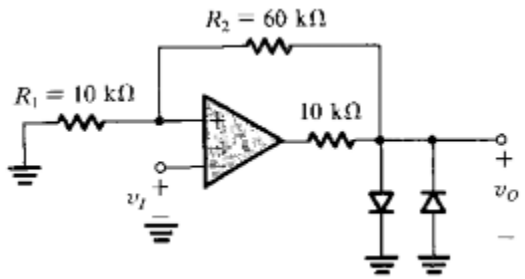
4) Find the DC gain and cut off frequency for the given circuit



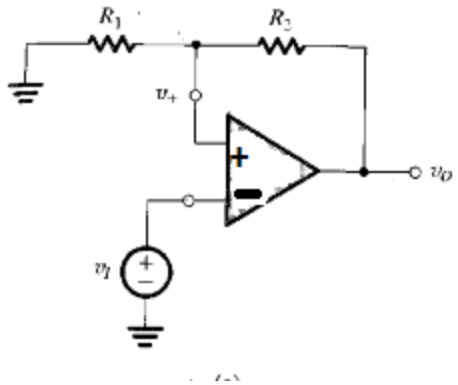
5) For the given circuit, find the value of resistance R and current across 20kΩ resistor



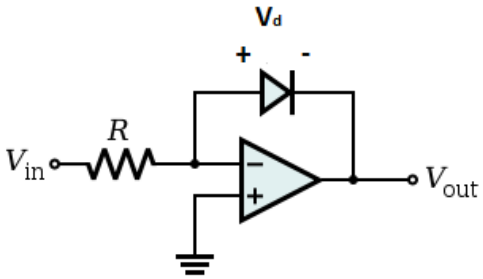
6) For the given op-amp circuit, the diodes are assumed to have a constant 0.7 V drop when conducting, and the op-amp saturates at +/- 12V. Assuming a sinusoidal input signal (5V peak to peak) is applied to -ve input terminal, sketch and label the transfer characteristics (V_o-V_I) for one complete time cycle.



7) Identify the given circuit. The opamp has output saturation voltages of +/- 12V. For R1=10KΩ, design the circuit to obtain threshold voltages of +/- 5V

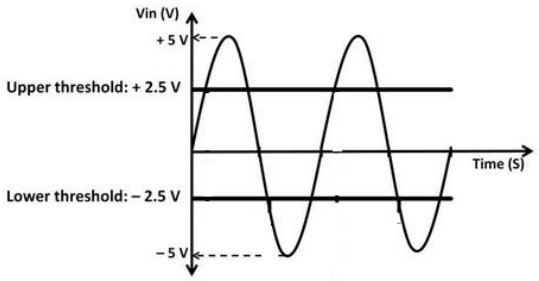


8) For the given circuit, derive the expression V_{out} in terms of Vin. What could be the application of this type of circuit?

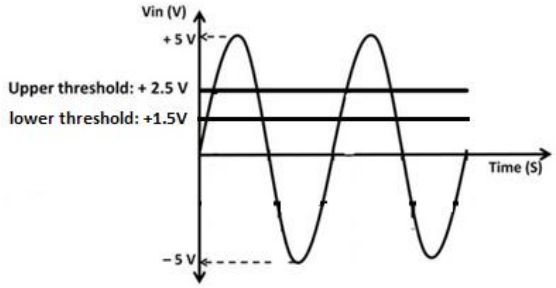


9) The input waveforms of a Schmitt trigger are given below. Draw the respective output waveforms assuming Vsat=+/- 12V. For part (a) assume the initial state of Vo=-12V, and for part (b) Vo=+12 V.

a)



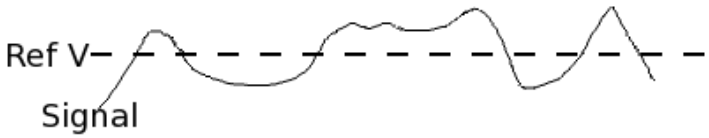
b)



10)

a) For a given positive reference voltage, an input signal is given to the open loop inverting comparator. Draw the output waveform aligning with the input signal.

b) What is the difference between a basic comparator and a Schmitt trigger?



OBJECTIVE QUESTIONS (1 MARK EACH)

1)
A monostable multivibrator is used to generate pulses of desired duration.(True/False)

The roll off rate or slope of first order filters is higher than second order filters (True/False)

2) Wien bridge oscillator can typically generate frequencies in the range

a) 100MHz-150MHz b) 10MHz-100MHz c) 1MHz-10MHz d) 1KHz-1MHz

3) A Bistable multivibrator is a

a) Free running oscillator b) Triggered oscillator c) saw tooth wave generator d) crystal oscillator

4) In a Schmitt trigger circuit (tick all those that are applicable)

a)V+=V- b)uses external triggering c) acts like regenerative comparator d) can be inverting/non inverting comparator

5) A 741 type opamp has a gain-bandwidth product of 1MHz. A non inverting amplifier using this opamp and having a voltage gain of 20dB will exhibit -3db bandwidth of

a) 50 KHz b) 100 KHz c) 1000/17 KHz d) 1000/7.07 KHz

6) In a circuit, if the open loop gain is 10^6 and output voltage is 10V, the differential voltage should be

a) 10μV b) 0.1μV c) 100μV d) 1μV

7) An opamp has an open loop gain of 10^5 and an open loop upper cutoff frequency of 10Hz. If this opamp is connected as an amplifier with closed loop gain of 100, then the new cutoff frequency is

a) 10Hz b) 100Hz c) 10KHz d) 100 KHz

8)

a) Schmitt trigger can also be called as Astable multivibrator(True/False)

b) Monostable multivibrator needs triggering to change from stable state to metastable state and vice versa. (True/False)

9) The scaling factor of a basic opamp integrator is

a) R/C b) C/R c) -RC d) -1/RC

10) For an opamp based RC phase shift oscillator, if the oscillations stops after a few cycles, then the cause is

a) The amplifier gain is greater than 29
b) The loop gain is less than 1
c) The loop gain is equal to 1
d) The loop gain is greater than 1