Fifth Semester Examination – 2011

ADVANCED ELECTRONICS CIRCUITS

Time: 3 Hours

Max. Marks: 70

Answer question No.1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. (a) Bring out the basic differences between voltage time base signal and current time base signal. **(2×10= 20)**

   (b) Mention the role of commutating capacitors in a bistable multi vibrator.

   (c) Multi vibrators are oscillators. Is the reverse of the statement true? Defend your statement.

   (d) What is a monostable multi vibrator? How does it differ from free running oscillator?

   (e) Explain the role of voltage follower in an instrumentation amplifier.

   (f) What is the basic difference between first order and second order Butterworth filter? Mention an application of notch filter.

   (g) Schmitt trigger is a squaring circuit. Justify.

   (h) What is a sweep circuit? State the importance of this circuit in high frequency applications.

   (i) What is the frequency of oscillation of Wein bridge oscillator? Is it possible to use the same in radio frequency applications? Justify your answer.

   (j) How UJT differs from BJT by constructional features? Is it an unipolar device? Why?

2. (a) Design a second order band pass filter with a mid band voltage gain A_v=50 (34dB), a centre frequency f_0=160Hz and a 3 dB bandwidth B=16Hz. **(5)**

   (b) Draw the circuit of a square wave generator using OPAMP and explain its operation by drawing the capacitor voltage waveform. Derive the expression for the period of a symmetrical waveform. **(5)**

3. (a) Sketch a regenerative comparator system and explain its operation. **(5)**

   (i) What parameters determine the loop gain?

   (ii) What parameters determine the hysteresis?

   (iii) Sketch the transfer characteristic and indicate the hysteresis.

   (b) Draw the schematic of an active notch filter and derive the expression for cutoff frequency. **(5)**

4. (a) What is commutating capacitors? Draw the circuit of a bistable multi vibrator using commutating capacitors and explain the operation principle. Derive the expression for maximum frequency of operation. **(5)**

(b) Give the low frequency model of an RC coupled amplifier and find the lower 3 dB frequency of the same.

It is desired to have a sag or tilt of not more than 10%.when a 50Hz square wave is impressed upon an amplifier stage. The output circuit resistance is $1k\Omega$.What minimum value of coupling capacitance is required if transistors with R_i=$1k\Omega$ are used? **(5)**

5. (a) Explain the principle of operation of a collector coupled astable multi vibrator and derive the expression for time period of oscillation. **(5)**

(b) Use unilateral device for unsymmetrical triggering of binary circuit and explain the principle of operation of the circuit. Draw relevant wave forms with respective to operating principle. **(5)**

6. (a) Design a mono stable multi vibrator using IC-555 to produce a symmetric square wave of frequency 4 KHz. Derive the expression for the time period of oscillation under such condition. Take C= 0.1 μ F. **(5)**

(b) What is a negative resistance switching device? Draw the circuit of a voltage controlled negative resistance device and plot the characteristic and load lines for bistable, astable and monostable operation. **(5)**

7. (a) Draw a monostable circuit using tunnel diode and show its operation path. Sketch the wave forms of the circuit and derive the expression for the duration of quasi stable state. **(5)**

(b) What are the methods by which voltage time base signals are generated? Explain the exponential sweep circuit for generation of the same. **(5)**

8. (a) What is an instrumentation amplifier? Draw the block schematic representation of the differential amplifier based instrumentation system with a transducer in the bridge. Derive the expression for the output voltage. **(5)**

(b) Draw the block diagram of IC-566(VCO) and briefly mention the function of each block. Determine the dc control voltage at lock if signal frequency is equal to 10 KHz, VCO free running frequency is 10.66 KHz and the voltage to frequency transfer coefficient of VCO is 6600Hz/V. **(5)**