Seventh Semester Examination – 2007

ADVANCED ELECTRONICS CIRCUITS

Full Marks – 70

Time : 3 Hours

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

The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2×10

    (a) What is Voltage Controlled Oscillator ? Give any two applications that require a VCO ?

    (b) What is an all-pass filter ? Where and why it is needed ?

    (c) Which multivibrator is used for Digital operation ?

(d) Draw the circuit for self-biased transistor binary.

(e) Define rise time and give its expression for cascaded compensated stages.

(f) Mention any four applications of Tunnel diode.

(g) What do you mean by Negative resistance ? Briefly explain.

(h) Define Displacement error. Give an expression.

(i) Explain briefly about bootstrap sweep.

(j) Define slope. Give an expression.

2. (a) Explain about all-pass filter and derive expression for phase shift. 5

(b) For the all-pass filter determine the phase shift between the input and output at $f = 2$ KHz. To obtain a positive phase shift, what modifications are necessary in the circuit ? 5

3. (a) Explain the principle of oscillator. Explain Wien bridge oscillator with a neat sketch. 5

(b) Design the Wien bridge oscillator for a frequency of oscillations $f_0 = 965$ Hz. 5

4. (a) Explain about Fixed-bias transistor binary with a neat sketch. 4

(b) Calculate the stable state currents and voltages for the Fixed-bias transistor binary consisting of two cross-coupled inverter circuits with parameter values : $V_{cc} = 12$ V, $-V_{bb} = -12$ V, Rc $= 2.2$ K, $R_1 = 15$ K, $R_2 = 100$ K. Assume that the transistor have a minimum h_{FE} value of 20. 6

5. (a) Explain with a neat sketch the operation principle of Astable Emitter-coupled multi. 4

(b) For a practical Emitter-coupled multi $V_{cc} = 30$ V, $R_2 = 2R_1 << R''$, $C = 0.1$ micro F, $R_{c2} = 0.2$ K, $R' = R'' = 1$ K, and $R_{e1} = R_{e2} = 3.3$ K.

Calculate (a) the voltage levels of the waveforms and (b) the frequency of oscillation. Assume silicon transistors with $h_{FE} = 30$. 6

6. (a) Explain Principle and characteristics of UJT with a neat sketch. 6

   (b) Explain in detail the application of UJT to generate sawtooth waveform. 4

7. Explain with a neat sketch the operation of a Voltage-controlled negative resistance switching circuit for bistable, astable, and monostable operation with waveform. 10

8. (a) Explain with neat sketches the IC555 Timer Astable operation with waveforms. 7

   (b) In a Astable Operation of IC555 Timer $R_A = 2.2K$, $R_B = 3.9K$ and $C = 0.1$ microF. Determine the positive pulse width tc, negative pulse width td, and free-running frequency f_0. 3

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