

Total number of printed pages – 4

B. Tech
CPEN 5305

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 ?

P.T.O.

- (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 $f = 2 \text{ KHz}$. 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 $f_0 = 965 \text{ Hz}$. 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 : $V_{cc} = 12 \text{ V}$, $-V_{bb} = -12 \text{ V}$, $R_c = 2.2 \text{ K}$, $R_1 = 15 \text{ K}$, $R_2 = 100 \text{ K}$. 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 $V_{cc} = 30 \text{ V}$, $R_2 = 2R_1 \ll R''$, $C = 0.1 \text{ micro F}$, $R_{c2} = 0.2 \text{ K}$, $R' = R'' = 1 \text{ K}$, and $R_{e1} = R_{e2} = 3.3 \text{ K}$.

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 $C = 0.1 \text{ microF}$. Determine the positive pulse width t_c , negative pulse width t_d , and free-running frequency f_0 . 3