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B. Tech  
CPEN 5303

Seventh Semester Examination – 2008

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) How can a low pass filter be converted to a high pass filter ?
  - (b) What is a VCO ? Give two applications that require a VCO.
  - (c) What is an instrumentation amplifier ? Give two applications of instrumentation amplifier.

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- (d) What is the role of a low pass filter and VCO in PLLs ?
- (e) Give three important applications of Tunnel diode.
- (f) What is done to change the state of a bistable multivibrator ?
- (g) What are commutating capacitors ?
- (h) What do you mean by 3-dB cut off frequency of a filter ?
- (i) Distinguish between active filters and passive filters.
- (j) List the characteristics of an instrumentation amplifier.
2. (a) What is the function of oscillator and how are they classified ? Draw the schematic diagram of a Wein-bridge oscillator and explain it. 5
- (b) A certain Wein-bridge oscillator uses  $R = 4.7 \text{ K}\Omega$ ,  $C = 0.01 \mu\text{F}$ , and  $R_F = 2R_1$ . What is the frequency of oscillation ? 5

3. (a) What is a universal active filter? Explain with an example and give block diagram and connection diagram. 5
- (b) Using the above example, design a 2<sup>nd</sup> order non-inverting Butterworth low pass filter with 10 KHz cut off frequency, a gain of 10,  $Q = 5$ , and  $V_S = 15\text{V}$ . 5
4. List important features of the IC 555 timer. Briefly explain the differences between the two operating modes of this timer. Draw circuit diagram and input and output waveforms for both the modes. 10
5. (a) UJT exhibits negative resistance characteristics. Justify. 5
- (b) Explain in detail the application of UJT as a saw tooth wave generator. 5
6. (a) Explain with a neat sketch the operation principle of collector-coupled monostable multi with waveforms. 5

- (b) A collector-coupled monostable multi has the following parameters:  $V_{CC} = 2V$ ,  $R_C = 2K$ ,  $R_1 = R_2 = R = 20K$ ,  $h_{FE} = 20$ ,  $r_{bb'} = 200\Omega$ , and  $C = 1000pF$ . Neglect forward-biased junction voltages and  $I_{CBO}$ . In the quasi-stable state  $Q_1$  is to be in its active region with a collector current of 4mA. Find  $V_{BB}$ . 5
7. (a) Explain in detail the monostable operation of a tunnel diode. Give circuit diagram and waveforms. 5
- (b) What is the need of low frequency compensation in amplifiers? Explain in detail. 5
8. (a) Explain in detail about voltage time base generator with circuit diagram and waveforms. 5
- (b) Explain in detail a fixed bias npn transistor binary. 5