B. Tech

CPEN 5305

Seventh Semester Examination – 2006

ADVANCED ELECTRONICS CIRCUITS

Full Marks : 70

Time : 3 Hours

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

*The figures in the right-hand margin indicate marks for the questions.*

1. Answer the following questions : 2×10

    (a) Why active filters are preferred over passive filters ?

    (b) Define the 3-dB cut-off frequency of a filter.

    (c) What are the modes of operation of a 555 timer ?

    (d) Distinguish between a first order and a second order filter.

P.T.O.

(e) Distinguish between astable, bistable and monostable multivibrators.

(f) What is done too change the state pf a bistable multivibrator ?

(g) What is the output of a UJT oscillator ?

(h) An OPAMP has a slew rate of 5V/μs. What is the largest sine wave output voltage possible at a frequency of 1 MHz ?

(i) Determine the period of the output waveform for the circuit of figure shown, when triggered by a negative pulse ?
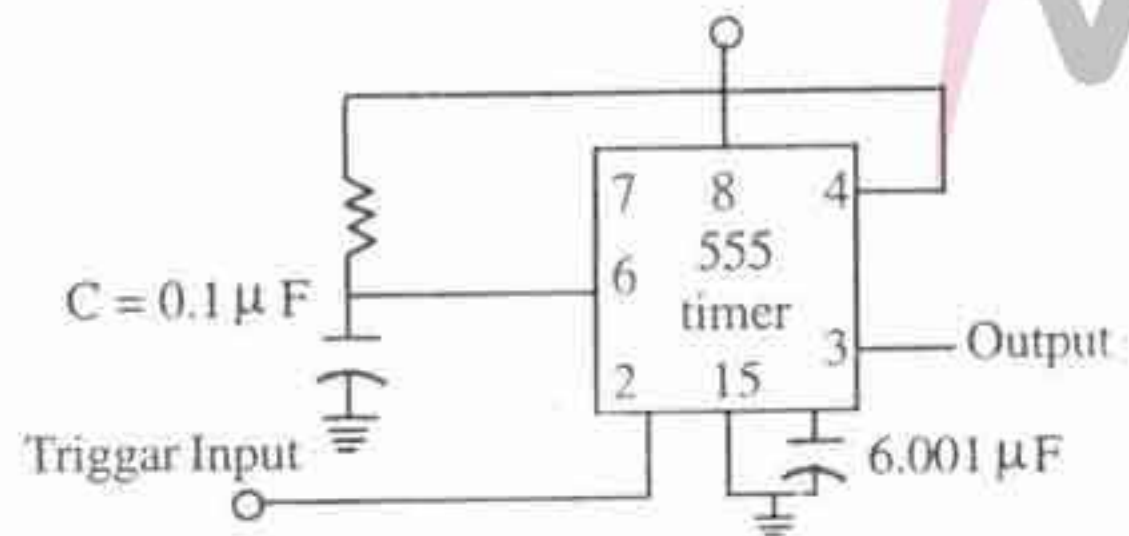
(j) What is the resonant frequency of the Wien bridge oscillator shown in figure ?
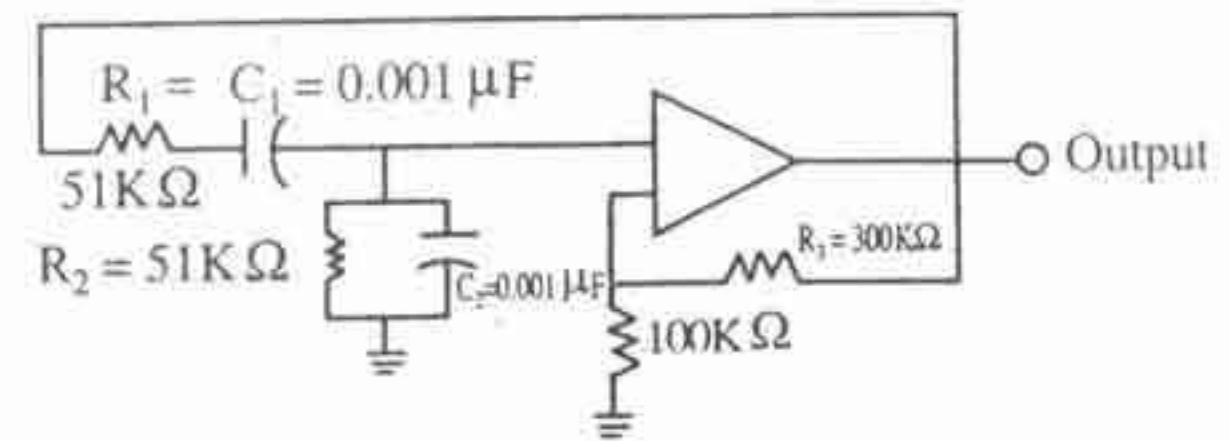
2. (a) Draw the internal circuit of a 555 timer and write a brief note on it. 5

(b) What is a voltage-controlled oscillator ? Give two applications that require a VCO. 5

3. (a) Design a second-order low pass filter at a high cut-off frequency of 1 kHz. Draw the frequency response of the filter. 5

(b) Describe with a circuit diagram the operation of a Wien bridge oscillator. Find an expression for the frequency of oscillation. 5

4. (a) What is an instrumentation amplifier ? Give three applications of the instrumentation amplifier. 5

(b) Give the circuit diagram for an opamp which acts as a voltage follower. 5

5. (a) Draw the block diagram for a phase-locked loop system (PLL). 5

   (b) Design an astable multivibrator to give a square wave output at 100KHz. The transistors to be used have $h_{fe} = 50$ and 6 volt dc supply is available. 5

6. (a) With the help of a circuit diagram explain the operation of a UJT relaxation oscillator. Sketch the waveforms at base1, base2 and emitter. 6

   (b) Derive the expression for frequency of oscillations. 4

7. Write notes on : 5×2

   (a) Phase-Locked Loops and their applications

   (b) Schmitt trigger circuit, its operation and application.

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