M.Sc. 1st Semester Examination, 2010

ELECTRONICS

(*Analog Electronics*)

PAPER—ELC-104

Full Marks : 50

Time : 2 hours

Answer **Q. No. 1** and any **three** from the rest

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable
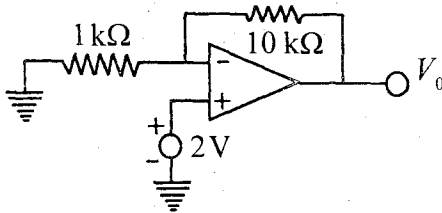
Illustrate the answers wherever necessary

1. Answer **all** questions :   2 x 5

   (*a*) What is SMPS ? Write down its differences from an ordinary power supply ?

   (*b*) Write down the advantages of active filters over passive ones.

(c) Find out V_0 of the following circuit.

(d) The output of an adder having three inputs is such that it is equal to the sum of the inputs with a negative sign. Draw the necessary circuit.

(e) Explain the term synchronization related television.

2. (a) Draw the circuit diagram of an active low pass 1st order Butterworth filter and describe its principle of operation.

(b) Define the terms Roll Off Rate and cut-off frequency for the above filter.

(c) Design a first order active high pass Butterworth filter at a cut-off frequency 1 kHz and a pass band gain of 2.   4 + 3 + 3

3. (a) Draw schematic diagram of a vidicon TV camera tube and describe its operation.

   (b) What do you mean by interlaced scanning ? How it operates ?

   (c) Explain why integrators are invariably preferred to differentiators in analog computations.   3 + (2 + 2) + 3

4. (a) Draw the circuit diagrams of logarithmic and antilogarithmic amplifiers using I_C741 and explain their operations.

   (b) Using logarithmic and antilogarithmic amplifiers discuss how analog multiplication and division could be performed.   6 + (2 + 2)

5. (a) Describe how phase detection could be achieved in PLL using XOR phase detector.

(b) What is frequency shift keying ?

(c) Discuss the principle of operation of a Schmitt trigger.
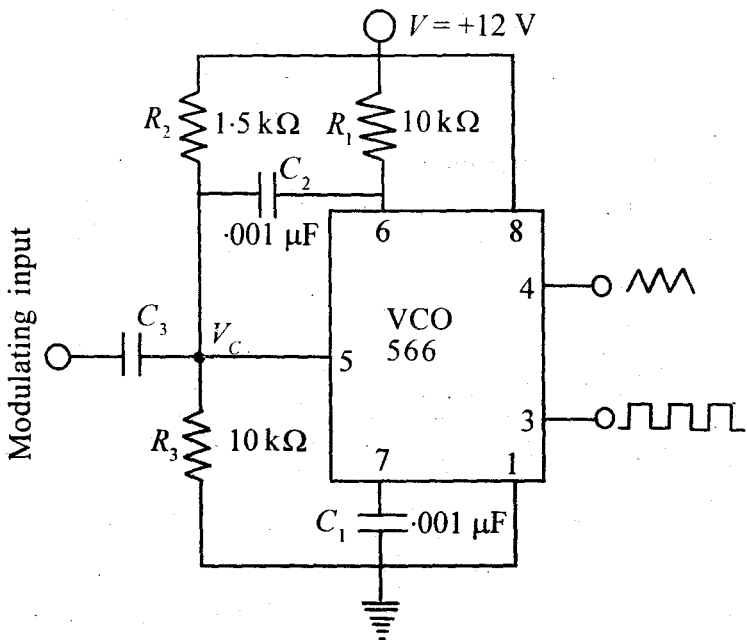
(d) For the following circuit prove that

$$V_0 = V_2 \left(\frac{R_1 + R_2}{R_3 + R_4} \right) \frac{R_4}{R_1} - V_1 \frac{R_2}{R_1}$$

$3 + 1 + 3$
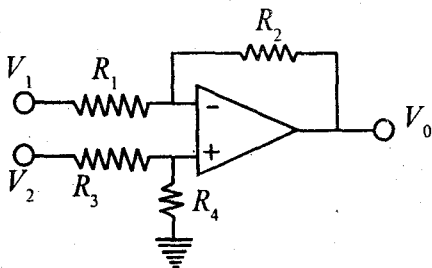
6. (a). What do you mean by a voltage controlled oscillator ?

(b) Explain the principle of operation of a VCO using proper circuit diagram.

(Cont

(c) The circuit with the values of the components is shown below :

(i) Determine the nominal frequency of the output waveforms.

(ii) Compute the modulation in the output frequencies if V_C is varied between 9·5 V and 11·5 V.

(*Turn Over*)

  (*iii*) Draw the square-wave output waveform if the modulating input is a sine wave.

(*d*) Discuss how you can generate a variable power supply using I_C LM 317.   1 + 3 + 3 + 3

[*Internal Assessment* : 10 Marks]

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