

Filter Theory

(REVISED COURSE)

(3 Hours)

YM-6748

[ Total Marks : 100

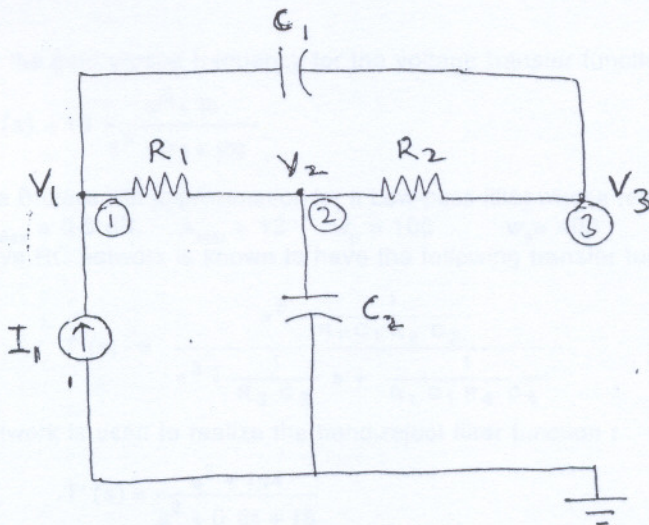
Nov. 1 Pr. 98  
Con. 4696-06.

N.B. (1) Attempt any five questions.

(2) Assume suitable data if necessary.

(3) Figures to the right indicate full marks.

1. (a) Compare active and passive filter. 5
- (b) List the advantages and applications of switched capacitor filters. 5
- (c) Explain with an example, how higher order active filters are realized. 5
- (d) What is the necessity of magnitude and phase approximation? 5
2. (a) Draw the Schematic circuit for a sallen and key high pass filter and derive an expression for the voltage transfer function in the standard form for a second order high pass transfer function in terms of parameters  $\omega_n$ ,  $Q$  and  $H_0$  and hence obtain expression for them in terms of circuit parameters. 10
- (b) Find the S-domain function  $V_3(s)/I_1(s)$  for the circuit shown in Figure. 10



3. (a) Draw a neat circuit diagram of a Akerberg Mossberg filter and derive the expression for its voltage transfer function having low pass characteristics. 10
- (b) Find the Butterworth approximation for a lowpass filter whose requirements are characterized by  $A_{max} = 0.5$  dB  $A_{min} = 12$   $W_p = 100$   $W_s = 400$ . 10
4. (a) List properties of a Butterworth function. Find network function for a third order low pass Butterworth filter and prove that this network function satisfies the properties listed. 10
- (b) Synthesize- 10

$$z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$$

5. (a) How is Leapfrog structure developed. Use this concept to realize a fifth order low pass filter. 10
- (b) Explain and draw neat circuit diagram of inverting, non-inverting and lossy integrators using parasitic insensitive switched capacitors. 10
6. (a) Draw, and explain Tow Thomas Biquadratic filter'. Derive relation for voltage transfer function if it is used as a high pass filter. 10
- (b) Derive the expression for a state variable configuration using three amplifier specify the expression for  $L_p$ ,  $H_p$  and  $B_p$  output. 10
7. (a) Explain how a resistor is realized by a MOS switched capacitor. 5
- (b) What is Biquadratic function? 5
- (c) Explain Gain equalizers and delay equalizers. 5
- (d) Explain generalized impedance converter (GIC). 5