

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions from remaining questions.

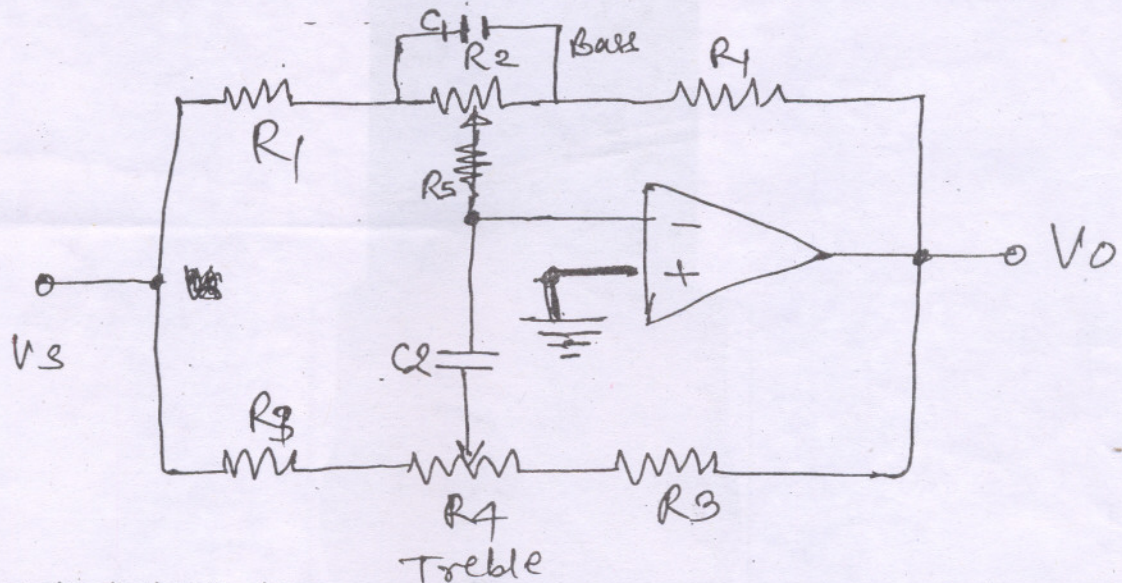
(3) Draw **suitable** diagrams wherever **needed**.

(4) Make **suitable** assumptions wherever **needed** and mention the **same**.

1. (a) Explain gain compression as ill effect of intermodulation distortion. 5
- (b) Explain loaded and unloaded Q of a resonant circuit. 5
- (c) Discuss input compensation technique for broadbanding. 5
- (d) With neat sketch explain first order digital phase locked loop. 5

2. (a) Design a lossless coupling network that matches a load of $(12 + j5)\Omega$ to a 40Ω source impedance at 20 MHz. 10
- (b) Explain how impedance level shifting can be accomplished in narrowband circuits without incurring cost of expensive and bulky transformers. Include proper mathematics for justification. 10

3. (a) Explain use of LM380 device as phono-amplifier having playback equalization characteristic. 8
- (b) Design a bass/treble control circuit with $f_1 = 30$ Hz, $f_2 = 10$ KHz and ± 20 dB maximum boost/cut at both ends. 12



Use circuit shown above.

4. (a) Derive transfer function of second order PLL and explain magnitude plot as a function of frequency for this PLL. 7+3
- (b) Explain how PLL can be used as — 5
 - (i) Frequency modulator 5
 - (ii) Amplitude demodulator. 5

5. What is hybrid transformer ? Where is it used in communication circuits ? For a three winding transformer (ideal case) derive the conditions for transformer to be biconjugate. 20
6. (a) Explain how switching time can be reduced in frequency synthesizers. 5
(b) Explain working of IC 1596 as balanced modulator. 5
(c) Explain frequency synthesizer that uses variable modulus divider. 5
(d) Explain set up and procedure to measure 'NOISE FIGURE' of an amplifier. 5
7. (a) Explain switching type mixers using two diode and four diode configurations. 10
(b) What minimum input signal will give an output signal to noise ratio of 0 dB in a system with input impedance of 50Ω , a noise figure of 8 dB and a bandwidth of 2.1 KHz ? 10
Take operating temperature as 290 K.
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