53 (IE 504) ELIN

2014

ELECTRONIC INSTRUMENTATION

Paper : IE 504

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks
for the questions.

Answer *any five* questions.

1. (a) Explain the principle of working of a Q meter.

Derive the relationship between input and output voltage in a RLC circuit in terms of Q factor. 3+5=8

(b) A coil of 10Ω resistor is connected in a Q meter circuit. Resonance occurs at a frequency of $1MHz$ with a tuning capacitor set at $65\ pF$. Calculate the percentage error introduced in the calculated value of Q if resistor $0\cdot2\Omega$ is used across the oscillator circuit. 5

(c) Describe the working of PMMC type meter.

7

2. (a) Explain the working of a parallely connected crystal oscillator.

6

(b) Determine the frequency of oscillation and the minimum value of R_f to sustain oscillation in a Hartley oscillator *Fig. I (a)*
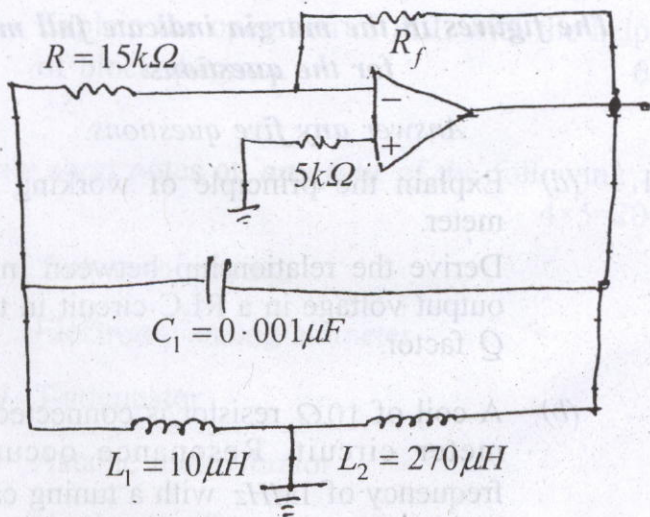
6

$R = 15k\Omega$

R_f

$5k\Omega$

$C_1 = 0 \cdot 001\mu F$

$L_1 = 10\mu H$ $L_2 = 270\mu H$

Fig. I (a)

(c) What is 'resonant frequency' ? Draw and explain the circuit of Colpitt's oscillator.

$$1+7=8$$

3. *(a)* What do you mean by inverting and non-inverting OPAMP ? 2

(b) Determine the CMRR in *dB* of an OPAMP having difference gain of 200 and common mode gain is 15. 3

(c) With the help of block diagram, explain the working of sweep frequency generator. 10

(d) Draw and explain the circuit to generate square wave using OPAMP. 5

4. *(a)* What is attenuator ? Explain the operation of a basic attenuator circuit. $1+5=6$

(b) Design a 20*dB*, 50Ω T attenuator. 6

(c) Describe the electronic analog DC voltmeter with necessary block diagram. 8

5. *(a)* Explain how analog ohmmeter works ? 6

(b) What do you mean by common mode interface ? What are the causes of current flow in ground loops ? $2+2=4$

(c) With the help of circuit diagram, describe how audio frequency can be generated. 8

(d) What is the function of IEEE 486 bus ? 2

6. (a) Describe how a digital voltmeter works ? 5

(b) How much of voltage is required at the CRT to deflect the deflection plate ?

Discuss in details about the horizontal deflection sub system. 1+8=9

(c) Explain the operation of PLL with the help of block diagram. 6

7. Write short notes on *any four* of the following : 4×5=20

(i) Two wire sensing

(ii) Electronic analog ammeter

(iii) T-attenuator

(iv) Astable multivibrator

(v) Hartley oscillator.

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