UNIT TEST-II

Subject: E.M.I
Marks: 20
Time: 01 Hr

Class: S.E.EXTCE (SEM-III)
Date: 10/2/2013

Q.1 Attempt following ...................................................... (6X2=12)
   a. What is the role of time base generator in CRO.
   b. State different modes of operation of DSO.
   c. Explain operating principle of Q-Meter.
   d. Define total harmonic distortion factor.
   e. What are the applications of spectrum analyzer.
   f. Explain one application of Lissajous pattern.

Q.2 Attempt any two ........................................................... (2X4=8)
   a. Draw and explain Wheatstone bridge for unknown resistance measurement.
   b. Explain the block diagram of CRO.
   c. Describe fundamental suppression Harmonic distortion analyzer (THD).
Q.1 Solve any four. (4x3M=12Marks)

1. What is the need of biasing of a transistor?

2. What is meant by Q-point?

3. What is thermal runaway? How it can be avoided?

4. Define stability factor. What is its significance?

5. Draw hybrid Π-model (High frequency model) for a BJT.

6. State Miller’s theorem.

Q.2 Any two. (4x2=8Marks)

1. Explain graphical determination of h-parameters.

2. Design a fixed bias circuit using silicon transistor having $h_{fe} = 100$, $V_{cc} = 12V$ and dc bias conditions are $V_{CE} = 6V$, $I_c = 3mA$, $V_{BE} = 0.7V$.

3. Find the voltage gain ($Av$) by using exact analysis of CE amplifier.
Q.1 Attempt any FOUR out of FIVE.
\hspace{1cm} 12 \text{ Marks}

2. Implement Full Adder using 3:8 Decoder circuit.

3) Implement the following Boolean function using Multiplexer.  
\[ F (A, B, C, D) = \Sigma m (0, 2, 3, 5, 7, 9, 12, 13, 15) \]

4) Draw the circuit diagram of J-K flip-flop using NAND Gate.

5) What is Glitch and Explain with suitable example?

Q.2 Attempt any one of the following.  
\hspace{1cm} 8 \text{ Marks}


2. Design a sequence detector circuit to detect 1101 non-overlapping sequence.
Q. 1 Solve any **two** problems.

i) Find the Fourier series for \( f(x) = 1 - x^2 \) in \([-1, 1]\).

ii) Find Half range sine series for \( f(x) = x^2 \) in \([0, \pi]\).

iii) Find the angle between two surfaces \( x^2 + y^2 + az^2 = 6 \) and \( z = 4 - y^2 + bxy \) at point \((1, 1, -2)\).

iv) If \( \vec{F} = (x + 2y + az)i + (bxy - 3y - z)j + (4x + cy + 2z)k \)

Prove that \( F \) is solenoidal and find \( a, b, c \) if \( F \) is irrotational.

Q. 2 Solve any **two** problems.

i) Find the directional derivative of \( \phi = xyz \) at point \((2, 1, -1)\) in the direction of normal to the surface \( x^2y + y^2x + z^2y = 3 \) at \((1, 1, 1)\).

ii) Find the Fourier Series for \( f(x) = \frac{1}{4}(\pi - x)^2 \) in \([0, \pi]\).

iii) Find the Fourier Series for \( f(x) = 2x - x^2 \) in \([0, 3]\).