

BITS, PILANI, DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
COMPREHENSIVE EXAMINATION
ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY
INSTR C355

Date: 10-6-2012
Time: 3 Hrs

Max Marks: 50
Weightage: 25%

Answer ALL Questions
All Questions carry Equal marks

1. (a) Draw the block diagram of a data logger and explain its working.
(b) Explain the following with figures:
(i) Transition(rise/fall) time (ii) Linearity (iii) Pre shoot, over shoot and ringing
(iv) Jitter

2. (a) Describe the working of a super heterodyne spectrum analyzer with a block diagram.
(b) What are the different windowing techniques used in an FFT analyzer.

3. (a) Explain how the ratio of two frequencies can be measured. Give the block diagram.
(b) Explain the following with reference to Instrument design.
(i) Component placement (ii) Cooling

4. (a) (i) Explain the characteristics of a Field bus.
(ii) Explain the architecture of a foundation field bus.
(b) Describe the equipment design and construction for Class I applications.

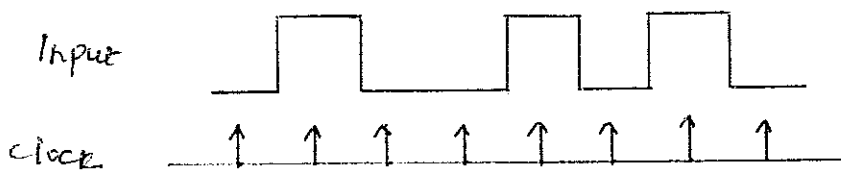
5. Design an instrument to measure vibrations generated in an aircraft engine.

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 TEST2 (Open Book)
ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY
INSTR C355

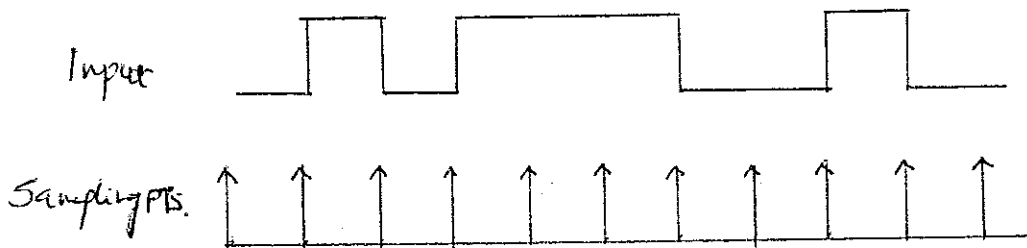
Date: 6-5-2012
 Time: 50 Mts

Max Marks: 15
 Weightage: 15%

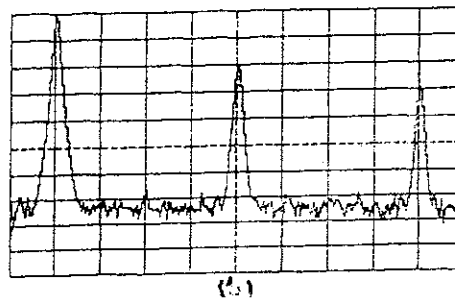
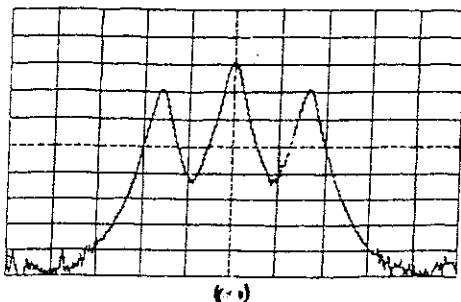
1. Design a frequency synthesizer which can synthesize frequencies 1.1, 2.1, 3.1, ... 9.1 Mhz. You can combine more than one technique to obtain the mentioned frequencies. (4M)
2. (i) Show the timing analyzer display.



- (ii) Show the sample points stored in the memory using transitional sampling.



- (iii) The spectrum of TWO signals is shown. Identify the signal appropriate to the spectrum.



(4M)

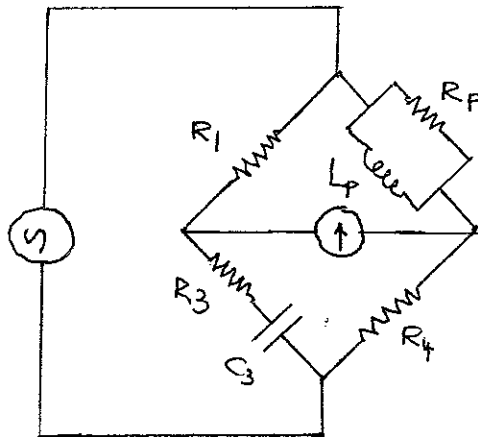
3. A sine wave is passed through a circuit which introduces certain phase shift. Design the block diagram of an instrument which can measure the phase shift introduced by the circuit. Use counter methods to do this. (4M)
4. A frequency counter with an accuracy of $\pm 1 \text{ LSD} \pm (1 \times 10^{-6})$ is employed to measure frequencies 100Hz and 1 MHz. Calculate the percentage measurement error in each case. (3M)

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TEST1 (Closed Book)
ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY
INSTR C355

Date: 18-3-2012
Time: 50 Mts

Max Marks: 20
Weightage: 20%

- 1) Draw the block diagram of a single slope A/D converter and explain its working. (4M)
- 2) (a) Show by figures the affect of sampling on a slow changing signal and fast changing signal. (2M)
(b) Explain the following performance characteristics of A/D converters. (2M)
(i) Gain error (ii) Integral non linearity error
- 3) (i) Sine wave and Square wave of 100Hz are applied to channel 1 and channel2. Show the oscilloscope display when using ALT and CHOP modes. (2M)
(ii) What is bandwidth limit ON/OFF. Illustrate with a figure. (1M)
(iii) How do you measure phase shift using a CRO. (1M)
- 4) Draw the circuit of a Kelvin bridge and derive the equation for unknown resistance. (4M)
- 5) A Hay inductance bridge operating at a supply frequency of 100 Hz balanced when the components are $C_3 = 0.1\mu\text{F}$, $R_1 = 1.26\text{ k}\Omega$, $R_3 = 75\Omega$ and $R_4 = 500\Omega$. Calculate the inductance , resistance and Q factor of the coil. (4M)



5. A transmitter transmits frequencies 820 to 845 MHz and the receiver receives frequencies 865 to 890 MHz. Which of the inter modulation distortion (IMD) components are received.
6. Sketch the spectrum of the following:
- (i) Two pure sine waves with different frequencies and amplitudes.
 - (ii) A sine wave with a small amount of harmonic distortion.
7. Show the block diagram of a vector analyzer.

BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2011- 2012
III YEAR-- QUIZ 1

Course Code: INSTR C355
Course Title: Elec. Instru & Instru. tech
Duration: 20 minutes

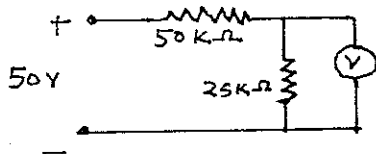
Date: 28.2.2012
MaxMarks: 8
Weightage: 8%

Name: ID No:

1. A 1mA meter movement with an internal resistance of 50Ω is to be used in 1A ammeter. What is the value of shunt resistance.

2. A 1mA meter movement with internal resistance of 50Ω is to be used in a 0-5V voltmeter. Find the multiplier resistance.

3. If the voltmeter sensitivity is $1k\Omega/V$, find the % error in the measurement.



4. Name TWO safety precautions to be observed while using voltmeter.

5. Draw the circuit of a basic series type ohmmeter.
6. An ac voltmeter has dc sensitivity of $2\text{k}\Omega/\text{V}$. Find the input resistance in the range 0-10 V.
7. What is Form factor for (i) Squarewave (rectangular) (ii) Triangular wave.
8. Draw the block diagram of an electronic ac voltmeter.