BITS PILANI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
Second Semester 2007-2008
COMPREHENSIVE EXAM
Electronic Instruments & Instrumentation Technology
INSTR UC355

Date: 21/5/08   Max Marks: 50

Time: 3 Hrs   Weightage: 25%

Answer ALL Questions

1 (a) Draw the block diagram of a data logger and explain the same.   (5M)
   (b) Explain the following with the help of a diagram.
       (i) Transition time
       (ii) Linearity
       (iii) Pulse levels
       (iv) Pre shoot, Over shoot and Ringing
       (v) Pulse width jitter

2. (a) Draw the block diagram of a Direct Digital Synthesizer. Explain its
       operation.   (5M)
   (b) Let the input channel noise be 250μV where the input signal has 1mV rms
       noise over the bandwidth of the front end computer. The counter measures
       a 1 MHz Sine wave with a 1S gate time. The ±1 count error is 0.001 Hz.
       The input rises to 350 mV in 1μS. Find the displayed frequency resolution.
                                                                        (5M)

3. (a) An ADC is to be interfaced between analog and digital circuits. Show the
       formation of a ground loop in the interface and the way to remove it.   (4M)
   (b) What precautions should be taken to make the work area less prone to
       ESD.   (3M)
   (c) Briefly explain typical parameters to select a barrier.   (3M)

4. (a) Compare Direct Digital Control, Distributed Control and Field bus
       system.
   (b) What are the topologies supported by the Foundation Field bus. Draw
       the connections.

5. Design the block diagram of an instrument to perform the following functions.
   (i) Generate Amplitude and Frequency modulated waveforms
   (ii) Display in time domain
   (iii) Show the spectrum of the above waves.
   (iv) Filter the waves as per the needs.   (10M)

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TEST2 (OPEN BOOK)
Electronic Instruments & Instrumentation Technology
INSTR UC355

Date: 13/4/08   Max Marks: 20

Time: 50 Mts   Weightage: 15%

1   Name the bridge that is used for the measurement of permittivity of a dielectric.

With out dielectric specimen between plates of C_S, balance is obtained with values $C_1=120pF$, C3= 150pF, $R_1=R_2=5K\Omega$. With the specimen inserted between plates of C_S, values for balance become $C_1=200pF$, $C_3=900pF$, $R_1=R_2=5K\Omega$. $\omega=5000$ rad/S. Find the relative permittivity of the specimen. Comment on the dissipation factor before and after the insertion of the specimen.   (5M)

2.   Suggest a synthesizer which can synthesize a frequency of 100.889 MHz. Show the block diagram with appropriate values and reference frequency chosen.   (5M)

3.   (a) Show the spectrum of

       (i)   Sine wave of 50 KHz
       (ii)   Amplitude modulated wave with f_C= 50KHz, f_m= 5KHz
       (iii)   Square wave   (3M)

    (b) What are the important parameters to be considered while selecting a Logic analyzer.   (2M)

4.   (a) How do you modify or create wave forms in AWG   (2.5M)

      (b) Give the specifications of a strip chart recorder.   (2.5M)

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TEST 1
Electronic Instruments & Instrumentation Technology
INSTR UC355

Date: 2/3/08   Max Marks: 40
Time: 50 Mts   Weightage: 25%

1 (a) Draw the basic DC ammeter circuit and DC voltmeter circuit .Derive the
        expression for the shunt/series resistance.   (4M)
   (b) Derive the expression for the Average value, RMS value and Form
        factor for an input of sinusoidal voltage to a full wave rectifier based meter.
                                                                        (6M)

2. (a) Draw the circuit of a 4 bit R-2R ladder D/A converter and derive the
        expression for V_{Out}.   (6M)
   (b) Explain the following:
        Resolution, Accuracy, Settling time, Power rejection ratio   (4M)

3 (a) What is aliasing. Draw the figures to show
        (i) The effect of sampling of fast signals
        (ii) Effect on the output shape.   (5M)
   (b) What are the different sampling methods used in digital oscilloscopes.(5M)

4 (a) Explain the following controls in a Digital oscilloscope.
        Display controls, Input coupling, bandwidth limit, Chop display,
        XY mode.   (5M)
   (b) Explain the different acquisition modes.   (5M)