

BITS PILANI DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY

Comprehensive Examination

ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY --INSTR C355

DATE: 8/6/2011

MARKS: 50

TIME: 3 Hrs

WEIGHTAGE : 25

1. (a) Using indirect frequency synthesizer, generate a frequency of 10MHz with a frequency resolution of 100 kHz. (5M)
(b) Draw the block diagram of a data generator and explain its important features. (5M)

2. (a) Draw the block diagram of a super heterodyne spectrum analyzer and explain. How the frequencies are are selected. (5M)
(b) Design a digital pH meter using counter techniques. A pH probe is provided which generates voltage corresponding to pH value. (5M)

3. (a) How do you use earth ground to eliminate shock hazard. Explain with figures. (2M)
(b) In reference to the design of instruments, discuss the following:
(i) Power distribution (ii) Cooling (6M)
(c) Discuss the various factors to be considered in instruments for class I applications. (2M)

4. (a) Draw a typical character frame in a serial communication using RS232 and explain. (3M)
(b) Explain HART field communication protocol. What are its benefits. (4M)
(c) Differentiate between Direct digital control, Distributed control and Field bus system with figures. (3M)

5. Design the block diagram of an instrumentation system to analyze Electroencephalogram (EEG). EEG can be classified into frequency bands Delta (0.5Hz to 3Hz), Theta (3Hz to 8Hz), Alpha (8Hz to 13Hz), Beta (13Hz to 20Hz) and Gamma (22Hz to 50 Hz). The instrument should have a facility for display and recording the signal. (10M)

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TEST2 (Open Book)

ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY --INSTR C355

DATE: 1/5/2011

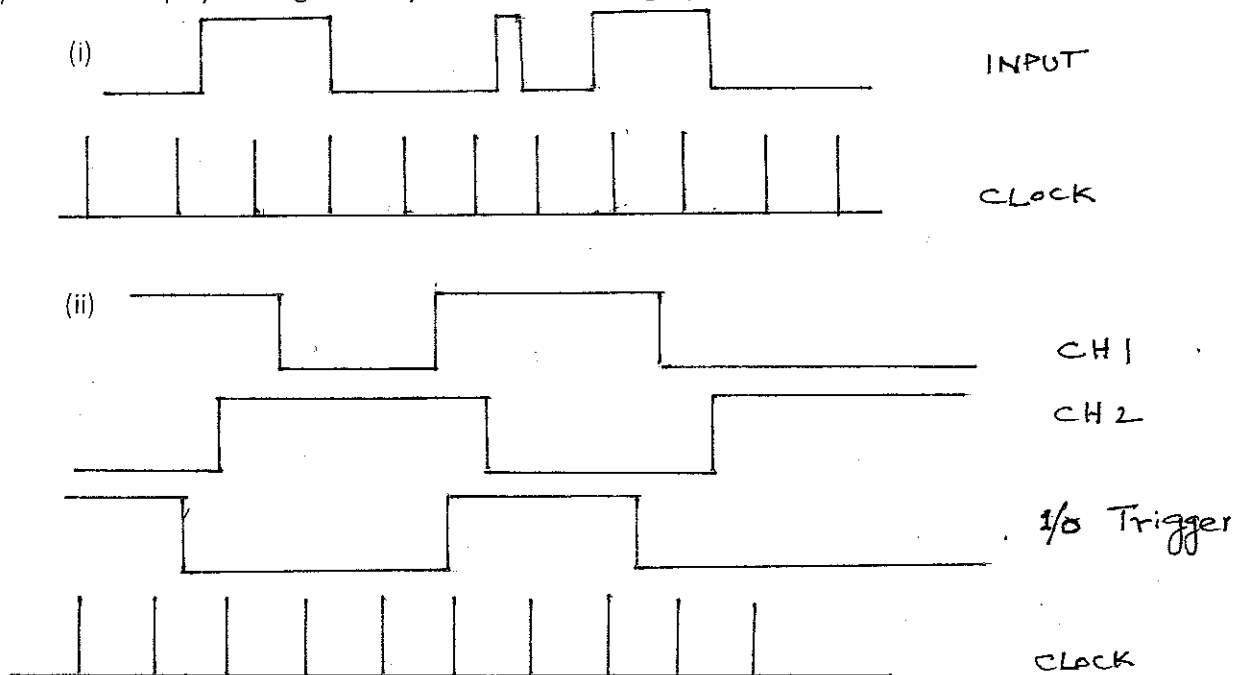
MARKS: 15

TIME: 50 MTS

WEIGHTAGE : 15

1. Design a Wein bridge to be used in a Wein bridge oscillator oscillating at a frequency of 10KHz. (4M)
2. Design a programmable decade indirect synthesizer to synthesize an output of 9.36 MHz from reference source of 3 MHz. (3M)
3. (a) Show the spectrum of the following signals. (4M)
 - (i) Amplitude modulated wave
 - (ii) Square wave

(b) Show the display of a logic analyzer for the following inputs .



4. Design an instrument to measure speed of a rotating disc. The display should in revolutions per minute. (4M)

BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
III Year EIE – II Semester 2010-11

TEST1

ELECTRONIC INSTRUMENTS & INSTRUMENTATION TECHNOLOGY
INSTR C355

Date: 10-3-2011
Max.Marks:20

Time: 50mts
Weightage: 20 %

Answer ALL Questions

1. (a) A PMMC instrument has full scale deflection of $100\mu\text{A}$ and a coil resistance of $1\text{k}\Omega$. Calculate the required shunt resistance value to convert the instrument into an ammeter with full scale deflection of (i) 100mA (ii) 1A . (2.5M)
(b) Draw the circuit of loaded peak detector and unloaded peak detector. Explain the same showing the input and output. (2.5M)

2. (a) Draw the block diagram of a single slope A/D converter and explain the same. (2M)
(b) A 25 V dc voltage is measured by analog and digital multimeters. The analog instrument on its 30V range and specified accuracy is $\pm 2\%$. The digital meter has a $3\frac{1}{2}$ digit display and an accuracy of $\pm(0.6 \text{ of required reading} + 1 \text{ digit})$. Determine the measurement accuracy in each case. (3M)

3. (a) What is Aliasing. Draw the figures to show (i) sampling of a fast varying signal (ii) Aliasing and its effect on the output wave shape. (2.5M)
(b) Explain the following errors which affect the accuracy of an A/D converter. Offset error, gain error and Absolute error. (2.5M)

4. (a) Explain the working of a Digital Phosphor oscilloscope. Show the block diagram. (2.5M)
(b) With the help of figures, show how the following waveforms are displayed with dc coupling and ac coupling. (i) Square wave of $3V_{pp}$ with 1V dc component. (ii) Sine wave of $1V_{pp}$ with 2 V dc component. (2.5M)

BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2010- 2011
III YEAR-- QUIZ 1

A

Course Code: INSTR C355
Course Title: Electronic Instr. & Instru. Technology
Duration: 20 minutes

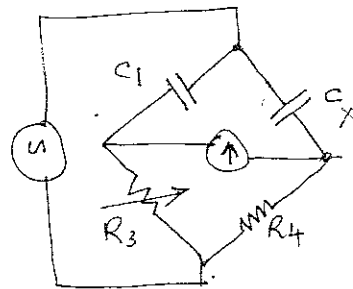
Date: 6-4-2011
MaxMarks: 8
Weightage: 8%

Name: ID No:

1. Find the series inductance L_s and resistance R_s of an inductive element using Maxwell's bridge given Z_1 the parallel combination of a resistor of value 470Ω and a capacitor of value $0.22\mu\text{F}$, $Z_2=Z_3=1\text{k}\Omega$. The bridge is driven by a 2kHz sinusoidal source.

2. Draw the circuit of a Wien bridge.

3. Calculate C_x in the bridge shown.



4. Kelvin bridge is capable of measuring resistances from _____ ohms to _____ ohms.

5. Differentiate between a Recorder and a Data logger.

6. Name FOUR writing mechanisms used in recorders.

7. ECG is recorded at a chart speed of 25mm/s. One cycle of signal extends over 20mm. What is the frequency of ECG signal.

8. Draw the block diagram of a data logger.

BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2010- 2011
III YEAR-- QUIZ 1

A

Course Code: INSTR C355
Course Title: Electronic Instr. & Instru. Technology
Duration: 20 minutes

Date: 18-5-2011
MaxMarks: 7
Weightage: 7%

Name: ID No:

1. Name the layers in the OSI network model.
2. Serial communication using RS232 requires FOUR parameters. What are they.
3. Name FOUR features of Bluetooth technology.
4. What is the advantage of HART protocol.

5. What are the significant features of Field bus.

6. What are the advantages of Field bus.

7. Show the Foundation field bus architecture.