College of Engineering, Pune
Second Year B. Tech. – (Institutional Elective)
Dept. of Instrumentation & Control
IE222 – Engineering Instrumentation

Date-10/11/2010   Timing: 3 hrs
Academic Year: 2010- 11   Max. Marks: 50

End Semester

Instructions:
1. Solve **any Five questions**
2. Assume suitable data
3. Draw neat diagrams wherever necessary
4. Use of non programmable calculators are allowed

			Marks
Q. 1	A.	Explain principle of working of electromagnetic flowmeter with neat diagram. Comment on the advantages and limitations of the flow meter.	5
	B.	Explain any non contact type level measurement technique. State its various applications.	5
Q. 2	A.	Explain the dynamic characteristics as stated below for the second order system with the help of graphical representation Rise Time Delay Time Maximum Overshoot Peak Time Settling Time	5
	B.	State different types of oscillators. Explain in details any audio oscillator with circuit diagram and oscillation criteria.	5
Q. 3	A.	What are different types of oscilloscopes? Explain block diagram of DSO and time domain aliasing in DSO. Suggest applications where DSO will be most useful for measurement. List different types of probes used for DSO.	10

Q. 4			
	A.	Explain Closed loop control system with a suitable example. Identify desired output, control input, actual output, controller, and feedback in the same example.	5
	B.	What are different scans in programmable logic controller (PLC)? Explain the specifications of input module.	5
Q. 5			
	A.	What is stability? How stability can be defined in reference with poles and zeros. Comment on stability of system mentioned in eq (1) with help of Routh – Hurwitz criteria System characteristic equation $$s^3 + s^2 + 2s + 24 = 0 \ \text{--------------- eq (1)}$$	5

	B.	Explain, how strain gauges can be used for the measurement of
		    (a) Pressure
		    (b) Force
		    (c) Displacement
			5

Q. 6			
	A	State & explain the need of automation in any plant. Develop a ladder diagram for conveyor system. - The conveyor has an proximity sensor $S1$ that detects boxes entering a workcell - There is also an optical sensor $S2$ that detects boxes leaving the workcell - The boxes enter the workcell on a conveyor controlled by output $C1$ - The boxes exit the workcell on a conveyor controlled by output $C2$ - If there are more than five boxes in the workcell the entry conveyor will stop - If the entry conveyor has been stopped for more than 30 seconds the count will be reset to zero.	10

-----------------------------Best of Luck-----------------------------------

College of Engineering, Pune

Second ~~Third~~ Year – Instrumentation & Control
SUB: Transducers(IE-201)
END Semester Exam

Date-23 /11/2010

Academic Year: 2010- 11

Timing: 3.0 hrs

Max. Marks: 50

Instructions:
1. All Questions are compulsory and carry equal marks
2. Assume suitable data
3. Draw neat diagrams wherever necessary
4. Use of non programmable calculators are allowed

			Marks
Q. 1	A.	Explain how encoders are designed for measuring linear displacement.	5
	B.	Write working principle of LVDT with neat diagram. List applications of LVDT. Which parameters of the specifications are important if the LVDT is to be selected for dynamic displacement measurement .	5
Q. 2	A.	A mercury manometer has one arm in the shape of a well and other as a tube inclined at 30 to the horizontal. The well is 4 cm in diameter and the tube 5 mm in diameter. Find the percentage error if no correction factor is used. Write application and limitation of mercury manometer.	5
	B.	List out techniques used for vacuum measurement. Explain any one with neat diagram.	5
Q. 3	A.	It is required to measure level of liquid –liquid interface having difference in dielectric constant of 0.1. Which level measurement technique will you prefer and why? Explain the same technique with neat diagram.	5
	B.	Explain with neat diagram how DP- cell is used for level measurement for closed tank and open tank.	5
Q. 4	A.	What are different techniques available for force measurement. Give in detail design consideration of load cell used for force measurement.	5
	B	With neat diagram, explain servo controlled dynamometer used for Shaft power measurement.	5

| Q-5 | A. | Why set of frequency sensitive amplifier is used in sound level meter? Explain sound level meter with neat diagram. | 5 |
| | B. | Write short note (any one)
  i) Chemical sensor
  ii) Biosensors | 5 |

COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra)

END Semester Examination
IE202 Analog Techniques
S. Y. B. Tech (Instrumentation and Control)

Year: 2010-11   Semester: I
Duration: 3 hrs   Max. Marks: 50

1. All questions are compulsory
2. Assume suitable data if necessary
3. Figures to right indicate full marks
4. Draw neat figures wherever required
5. Use of non programmable calculator is allowed

Q.1

A) Draw circuit diagram of Class A power amplifier and explain in detail its operation.   [5]

B) Compare buck, boost and buck-boost power converters?   [5]

Q.2

A) Draw the UJT characteristics and explain in detail all region of operation [5]

B) What do you mean by biasing of a transistor? Explain in detail different BJT biasing techniques   [5]

Q.3

A) List two application of following devices   [5]
   1. MOSFET 2.SCR 3. TRIAC 4.DIAC 5.UJT

B) Compare switching regulators with linear regulators? Why switching regulators are prefers over linear regulators?   [5]

Q.4

A) What do you mean by filtering of an analog signal? How will you remove a noise signal 1 ~ 50 Hz from original signal of interest of 2KHz? Draw a schematic and briefly explain.   [5]

B) Draw square wave generator using OP-Amp and explain in detail the operation of the circuit?   [5]

Q.5

A   Design a amplifier using OP-Amp to amplify 100 mv signal to 2 volts   [5]
derive the equation and design the component associated with the circuit

B   The boost regulator has an input voltage V_s = 6 V. The average output   [5]
voltage is 15 V and average load current is 0.5 A. The switching
frequency is 20 KHz. If L = 250µH and C = 440µF, determine duty
cycle, the ripple current ΔI , the ripple voltage of the filter

COLLEGE OF ENGINEERING PUNE

(An Autonomous Institute of Government of Maharashtra)

End Semester Examination

(IE 203) Basic Instrumentation

Programme: S. Y. B. Tech (Instrumentation and Control)
Year: 2010-11   Semester: I
Duration: 03 hrs   Max. Marks: 50

Instructions:
1. All questions are compulsory.
2. Figures to right indicate full marks.
3. Draw neat figures wherever required.
4. Use of non-programmable calculator is allowed.
5. Assume suitable data if required.

Q.1 (a) A PMMC instrument with full scale deflection of 85µA and a coil resistance of 750 Ω is required to be converted into a voltmeter. Determine the required multiplier resistance if the voltmeter is to measure 30 V at full scale. Also calculate:

1. Sensitivity of the voltmeter

2. Applied voltage when the instrument indicates 0.2 of FSD   05

(b) Describe the construction and working of series type ohmmeter with the significance of half scale value.   05

Q.2 (a) Explain the working of XY recorder with suitable diagram. Also list down its two applications.   05

(b) State the significance of Aryton /Universal shunt for dc ammeter.

A PMMC instrument has three Aryton shunt connected with the values as R1=0.07 Ω, R1=0.69 Ω, and R3=6.9 Ω across it to make an ammeter. The meter resistance is 1 KΩ and FSD= 80 µA. Calculate the three ranges of the ammeter.

05

Q.3 (a) Describe the functions of the following in energy meter:
(i) Moving disc (ii) permanent magnet (iii) current coil
(iv) voltage coil (v) registering mechanism   05

(b) Derive the balance equations for inductance comparison
bridge. State any one application for the same.   05

Q.4 (a) State any two differences between PMMC and
Electrodynamometer type instruments. With the help of
proper diagram, explain the working of electrodynamometer
type of wattmeter. Also describe the governing equations
for the wattmeter.   08

(b) It is required to determine capacitance of a material used in
polymer industry. Which type of bridge will be suitable for
the same? Justify your answer.   02

Q.5 (a) Discuss the precautions for the measurements with the
following instruments:

     i. Multirange Wattmeter

     ii. Energy meter in line application

       OR

     ii. Voltmeter for ac voltage   04

(b) Discuss the applications of magnetic tape recorder and X-t
recorder.   02

(C) How will you adjust null, and Sensitivity of the Wheatstone
bridge? Also state calibration method for the same.   04

-------------------- All the best! -------------------------------