

UNIVERSITY OF PUNE
[4363]-195
T. E. (Instrumentation & Control)
Examination 2013
Industrial Management
(2008 Pattern)

[Total No. of Questions : 12] [Total No. of Printed Pages : 2]
[Time : 3 Hours] [Max. Marks : 100]

Instructions :

- (1) Answer any 3 question from each section.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Neat diagram must be drawn wherever necessary.
- (4) Black figures to the right indicate full marks.
- (5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- (6) Assume suitable data, if necessary.

SECTION-I

- Q1.
- a) With the diagram explain BCG Matrix. [8]
 - b) What is Business Process Re-Engineering? Why it is important? Give different steps involved in it and also mention its advantages. [10]
- OR
- Q2.
- a) Explain how SWOT analysis is helpful in relation to a manufacturing industry? [10]
 - b) Explain with generalized example Cause & Effect diagram. [8]
- Q3.
- a) Explain any 5 clauses of ISO-9001. [10]
 - b) Write a short note on Statistical Process Control. [6]
- OR
- Q4.
- a) Explain with importance Quality Circle. [6]
 - b) Write short notes on:
 - 1) Role of R&D
 - 2) Mergers and Takeovers [10]
- Q5.

- a) In an industry for a component the daily consumption rate is 1200 units. The cost of each unit is Rs. 2 and inventory carrying cost is 0.50. the cost of placing and receiving the order is Rs. 25. Assume total working days in a year are 300. Calculate-
- 1) EOQ
 - 2) No. of orders per year
 - 3) Inventory cycle time
 - 4) Annual total minimum cost [10]
- b) What is supply chain management? Give its advantages. [6]

OR

Q6.

- a) Write short notes on: [10]
- 1) Material handling & Storage
 - 2) Purchasing
- b) Explain Store Keeping. [6]

SECTION-II

Q7.

- a) Explain in relation with Manpower planning. [10]
- 1) Need
 - 2) Objective
 - 3) Requirements
 - 4) Factors affecting
- b) What is Motivation? How it helps in attaining the production objectives? [8]

OR

Q8.

- a) Explain in detail Training. [12]
- b) What is the role of job description in manpower selection? [6]

Q9. Explain CPM and PERT as project network analysis techniques. [16]

OR

Q10.

- a) Write a note on Capital structure. [8]
- b) What is break even analysis? Give its assumption and importance. [8]

Q11. Write short notes on – [16]

- a) ISO 14000
- b) Global warming

OR

Q12. Explain in detail 'Disaster Management'. [16]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]-198

T. E. (Instrumentation & Control) Examination - 2013

PROCESS LOOP COMPONENTS (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 *Answer 3 questions from Section I and 3 questions from Section II*
- 2 *Answers to the two sections should be written in separate answer-books.*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Figures to the right indicate full marks.*
- 5 *Use of electronic pocket calculator is allowed.*
- 6 *Assume suitable data, if necessary.*

SECTION -I

- Q.1 A A pressure sensor outputs a voltage varying as 90 mV/psi. develop signal conditioning to provide 4 to 20 mA as the pressure varies from 50 to 120 psi. 12
- B Draw temperature control loop using standard symbols and explain its components in brief. 6

OR

- Q.2 A Explain zero elevation and zero suppression with respect to DPT for level measurement. 6
- B What is the need of standard signals? Explain various standard signals used in process industries. 6
- C A sensor resistance changes linearly from 100 to 180 Ω as temperature changes from 20 to 120 $^{\circ}\text{C}$. Find a linear equation resistance and temperature. 6
- Q. 3 A Explain with suitable example self regulation and process lag. 8
- B Explain with suitable example Multiposition mode. 8

OR

- Q. 4 A Explain the following terms w.r.t to controllers. 16
- i) Proportional Band
- ii) Characteristics of derivative action
- iii) Applications of two position mode.

iv) Distance velocity lag.

- Q. 5 A What do you know about velocity and position algorithm? 6
 B Develop physical ladder diagram for a motor with following: NO start P.B., NC stop P.B., thermal overload limit switch opens on high temperature, green light when running and red light for thermal overload. 6
 C Draw front fascia of digital controller 4

OR

- Q. 6 A Explain how frequency response method can be used to tune a process control loop. 8
 B Explain the role of converters in process industries. Describe I/P converter in detail. 8

SECTION II

- Q. 7 A Explain in brief w.r.t PLC. 8
 i) Timers and Counters
 ii) Rack and slot configuration
 B Develop a programmable ladder diagram for stirred tank heater. State your assumptions clearly. 8

OR

- Q. 8 A Explain with suitable sketch architecture of PLC. Give one example of AI and DO. 8
 B Develop programmable Ladder diagram for mixing of two liquids as per given sequence: 8
 When the start P.B. is pressed, the inlet valve A switches ON till the middle level sensor has not sensed the liquid. When middle level is sensed inlet valve B switches ON till the high level sensor has not sensed the liquid. Then the motor spins the stirrer for 10 seconds for mixing of both the liquids. After then product is to be removed through drain valve till the low level is not reached. State your assumptions clearly.

- Q. 9 A Explain how positioners enhance performance of control valves. 6
 B What do you mean by “Installed characteristics of control valve”? Why they are different than inherent characteristics. 10

OR

Q. 10	A	State the importance of failsafe condition.	4
	B	Explain w.r.t control valve	12
		i) Control valve placement.	
		ii) Rangeability	
		iii) Guide	
		iv) Actuator	
Q. 11	A	Write notes on	18
		1. Control Valve noise	
		2. High temperature service valve	
		3. Control valve dynamic performance	
		OR	
Q. 12	A	Compare cavitation and flashing? List techniques to reduce it.	8
	B	Why sizing is necessary in control valve? List the different criteria's for control valve selection.	10

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[4363]-196
T. E. (Instrumentation) Examination-2013
Digital Signal Processing Fundamentals
(2008 Course)

[Total No. Of Questions: 12]
[Time: 3 Hours]

[Total No. Of Printed Pages: 4]
[Max. Marks: 100]

Instructions:

- (1) *Answers to the two sections should be written in separate answer-books.*
- (2) *Black figures to the right indicate full marks.*
- (3) *Neat diagrams must be drawn wherever necessary.*
- (4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- (5) *Assume suitable data, if necessary.*

SECTION-I

Q. 1. A) Define system. Explain the classification of systems in detail. (8)

B) Determine whether the following systems are Linear, time-invariant, static, causal and stable. (10)

i. $y(n) = x(n^2)$

ii. $y(n) = x(-n + 1)$

OR

Q. 2. A) Determine the convolution of following sequences. (10)

$$x(n) = \left(\frac{1}{2}\right)^n, 0 \leq n \leq 4$$

$$h(n) = \left(\frac{1}{4}\right)^n, 0 \leq n \leq 6$$

B) Identify the following signal are energy or power signals. (8)

i. $x(n) = \left(\frac{1}{2}\right)^n u(n)$

ii. $x(n) = e^{-0.2n}u(n)$

Q. 3. A) Plot the magnitude and phase response of the system described by (8)
following difference equation

$$y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) - \frac{1}{2}x(n-1)$$

Use angular frequencies $(w) = (0, \pm \frac{\pi}{4}, \pm \frac{\pi}{2}, \pm \pi)$

B) Realize the following difference equation. (8)

Using i) Direct-from I

ii) Direct-from II

$$y(n) - 0.7y(n-1) + 0.12y(n-2) = x(n) + x(n-1)$$

OR

Q. 4. A) Obtain realization of the system described by, (8)

$$H(Z) = 1 + \frac{1}{2}Z^{-1} + \frac{3}{4}Z^{-2} + \frac{5}{2}Z^{-3} + \frac{3}{4}Z^{-4} + \frac{1}{2}Z^{-5} + Z^{-6}$$

B) Determine and sketch magnitude and phase response of the LIT system(8)

$$\text{Given by, } y(n) + \frac{1}{2}y(n-1) + x(n-1) = x(n)$$

Use angular frequencies $w = (0, \frac{\pi}{2}, \pi)$

Q. 5. A) State and prove any two properties of DFT. (6)

B) Computer 4-point DFT of following sequence. (6)

$$x(n) = \{1, -1, 1, -1\}$$

C) Determine circular convolution of (4)

$$x_1(n) = \{3, 1, -1, 2\}$$

$$x_2(n) = \{2, 0, 2, 0\}$$

OR

Q. 6. A) For the following sequences (10)

$$x_1(n) = \{0.2, \frac{1}{3}, 1, 2\}$$

$$x_2(n) = \{1, 2, 3, 4\}$$

Determine following

i. $X_1(k)$

ii. $X_2(k)$

iii. $X^3(n)$ such that $X_3(k) = X_1(k) X_2(k)$

B) State and prove any two properties of DFT. (6)

SECTION-II

Q. 7. A) Deduce the 8-point radix-2 Decimation in time FFT algorithm. (8)

B) Find the 8-point DFT of $x(n)$ using decimation in frequency (DIF) FFT algorithm (8)

$$x(n) = \{0, 0; 1, 1\}$$

OR

Q. 8. A) Deduce the 8-point radix-2 decimation in frequency (DIF) FFT algorithm. (8)

B) Find 8-point DFT of $x(n)$ using DIT FFT algorithm. (8)

$$x(n) = \{1, 1, 1, 1, 1, 1, 0, 0\}$$

Q. 9. A) Design FIR low-pass filter for following specification . (12)

- 1) Cut -off frequency = 450Hz
- 2) Sampling frequency = 1000Hz
- 3) Length of filter = 7
- 4) Use rectangular and Barleft windows.

B) Explain various window functions used in FIR filter design. (6)

OR

Q. 10. A) The desire frequency response is given as (12)

$$H_d(e^{j\omega}) = \begin{cases} e^{-j\alpha\omega} & 0 < |\omega| < \frac{\pi}{6} \\ 0 & \frac{\pi}{6} < |\omega| < \pi \end{cases}$$

Design FIR filter using hamming window and $M=13$

B) Compare FIR and IIR filters. (6)

Q. 11.A) For the analog transfer function. (6)

$$H(s) = \frac{2}{(s+1)(s+3)}$$

Determine $H(z)$ using impulse invariance method. Assume $T=0.1$ sec

B) Design the digital Butterworth filter using bilinear transformation (10)

With $T=1$ sec following specification.

$$\begin{aligned} 0.8 \leq |H(e^{j\omega})| \leq 1, & 0 \leq \omega \leq 0.2\pi \\ |H(e^{j\omega})| \leq 0.2, & 0.6\pi \leq \omega < \pi \end{aligned}$$

OR

Q. 12. A) Convert the analog filter (6)

$$H(s) = \frac{(s+4)}{2(s+1)(s+2)}$$

into digital filter using impulse invariance method with $T=0.1$ sec

B) Design digital Butterworth filter that has -2db pass band attenuation (10)

at a frequency of 20 rad/sec and at least -10db stop band attenuation at 30 rad/sec.

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T. E. (Instrumentation), Examination - 2013

Instrumentation System Design

(2008 Course)

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- (1) Answer **any three** questions from each section.*
 - (2) Answers to the **two sections** should be written in **separate answer-books**.*
 - (3) Black figures to the right indicate full marks.*
 - (4) Neat diagrams must be drawn wherever necessary.*
 - (5) Your answer will be valued as a whole.*
 - (6) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
 - (7) Assume suitable data, if necessary.*
-
-

SECTION-I

- Q. 1. A) What are approaches adapted for product design? Explain importance Of beta testing. (8)
- B) Explain Ingress Protection (IP34) and (IP54) and their importance in industrial field. (8)

OR

- Q. 2. A) What are the different phases of product life cycle? (8)
- B) Explain different parts of general of an instrumentation system. (8)
- Q. 3. A) Explain the phenomena of generation of Electro static Discharge (ESD) and it's effects on instruments. What are the ways to avoid it? (10)
- B) Explain different types of noise occurred in instrumentation system and the cares taken to minimize it? (6)

OR

- Q. 4. A) What are the different causes, which forces the software program to go in to infinite loop? Explain any method to avoid the same. (10)
- B) Explain 'Human body model' referred for testing instrumentation Systems. (6)
- Q. 5. A) What are the internal blocks of AD595? Explain use of AD595 as a set point controller. How does chattering problem solved in it? (10)

B) How does an HCNR 200 help to isolate analog voltage signal? (8)
Explain the working of it with functional circuit diagram.

OR

Q. 6. A) How does AD620 is used for measurement of pressure. Explain (10)
Operation with 5Vdc supply.

B) Comment on internal blocks of XTR 110. Can it be used as 10Amp. (8)
Current source?

SECTION-II

Q. 7. A) Explain working of BCD input/output pins of ICM7217A How (10)
Does a 4 digit thumb wheel switch connected to ICM7217A? Explain
With the help of block diagram.

B) How does an MCT 2E used to drive a delay and what is the role of (8)
base terminal of photo transistor?

OR

Q. 8. A) What configuration of transistors is used in ULN 2803? What are the (10)
Advantages of the same over discrete Transistor design?

B) Explain the terms 'Capture range' and 'Lock range' with reference (8)
to phase lock loop. Support your answer with an example.

Q. 9. A) Explain general component layout scheme followed for designing (8)
Printed circuit boards.

B) Explain any one mass soldering method for soldering printed (8)
circuit boards.

OR

Q. 10. A) What are the rules for designing analog circuits? Support your (8)
Answer with a case study.

B) Elaborate on the different advantages of flexible printed circuit (8)
Boards.

Q. 11. Explain different regions of 'Bath tub curve' with the help of (16)
a case study.

OR

Q. 12. What are the steps involved in designing a virtual instrumentation (16)
system. Explain with an example.

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[4363]-191

T. E. (INSTRUMENTATION AND CONTROL) Examination 2013

INSTRUMENTATION FOR CHEMICAL ANALYSIS (306261)

(2008 Pattern)

[Total No. of Questions:10]

[Total No. of Printed pages :3]

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answers to the two Sections should be written in separate answer-books.*
- (2) Neat diagrams must be drawn wherever necessary.*
- (3) Figures to right indicate full marks.*
- (4) Assume suitable data, if necessary.*

SECTION-I

- Q.1 a) State the advantages of Instrumental methods of chemical analysis over classical methods of analysis. [8]
- b) Explain the Principle & experimental setup for voltamery. [8]

OR

- Q2. a) Give detailed classification on Instrumental methods of analysis. [8]
- b) Explain coulometry with neat diagram. [8]
- Q3. a) Derive Beer-Lambert's law [8]
- b) With the help of neat diagram, explain double beam spectrophotometer. [8]

OR

Q4. a) Explain the construction and working of the Hollow Cathode Lamp [8]
used in AAS.

b) Explain the plasma type of excitation in AES? Why argon is used in ICP torch? [8]

Q5. Compare the following: (any three) [18]

a) Single beam instrument and double beam instrument

b) Absorption spectra and Emission spectra

c) Dispersive IR spectrophotometer and FTIR spectrophotometer

d) Quantum detectors and Thermal detectors in IR spectrometry

SECTION-II

Q6. a) What is chemical shift in NMR Spectrometer. How sensitivity can be [8]
increase in NMR spectrometer?

b) What is fluorescence. Explain with a neat diagram principle and working [8]
of a spectrofluorimeter.

OR

Q7. a) What is Raman Effect? Explain Raman Spectrometer with neat diagram. [8]

b) Explain CO₂ & O₂ analysers with neat diagram [8]

Q8. a) Explain the principle of Mass Spectrometer. Explain any one detector [8]
used in MS.

b) Explain HPLC with neat diagram. [8]

OR

Q9. a) Explain Time of flight type Mass Spectrometer with neat diagram.

State advantages of double focusing technique. [8]

b) Enlist detectors in GC. Explain any one detector with neat diagram. [8]

Q10. Write short notes on (any three) [18]

a. Scintillation counter

b. Instrumentation for X-ray spectrometry

c. Auger Electron spectroscopy

d. GC detectors

UNIVERSITY OF PUNE
[3661]-102
T. E. (Instrumentation & Control)
Examination - 2013
EMBEDDED SYSTEM
DESIGN
(2008 Pattern)

[Time : 3 Hours]

[Max. Marks : 100]

Total No. of Questions : 12

[Total No. of Printed Pages : 4_]

Instructions :

- (1) *Answers three questions from Sections I and three questions from Section II.*
 - (2) *Answers to the two sections should be written in separate answer-books.*
 - (3) *Neat diagrams must be drawn wherever necessary.*
 - (4) *Neat diagrams must be drawn wherever necessary.*
 - (5) *Black figures to the right indicate full marks.*
-

SECTION I

- Q1) A) Explain in detail memory organization of on-chip RAM of 8051 μ C. [8]
B) Explain the Timer/ Counter structure of 8051. Also explain the SFR registers required for its functioning. [8]

OR

- Q2) A) Explain the port structure P1 port of 8051. Discuss how to make it as an input port. [8]
B) Explain the function of the following pins of 8051
a) INT0 and INT1
b) PSEN
c) ALE
d) RXD and TXD
- Q3) A) Seven numbers are stored in seven consecutive RAM memory locations starting with address 40H. Write a program for finding the smallest number among seven numbers. [8]
B) It is desired to send the name "INSTRUMENTATION" serially to PC continuously at baud rate of 4800. Crystal frequency of 8051 is

11.0592Mhz. Write a program in assembly language to do this. Draw the interfacing diagram. Also briefly explain the SFRs used for the same. [10]

OR

Q4) A) A pulsewidth of the clock signal is to be measured by the microcontroller. Program the microcontroller to do the same. The output should be available on the ports in binary format. Draw the circuit diagram clearly showing the connections. Also mention the maximum pulsewidth that can be measured by this arrangement. [10]

B) Identify the addressing modes of the following instructions

a) Add A, @ RO

b) Mov B, #40H

c) Subb A, 40H

d) MOV P1, R5 [4]

C) Explain the IE and TCON registers with reference to interrupts. [4]

Q5) A) Interface 4×4 keyboard to 8051 microcontroller. Write a program and draw the interfacing diagram. [12]

B) Interface the electromechanical relay to 8051. [4]

OR

Q6) A) LCD display is to be interfaced to 8051 as per the following requirement

a) On the first line of display- from the second position onwards bring “University OF”.

b) On the second line display – from the fourth position onward bring “Pune”

c) Cursor should be ON and it should not be blinking Draw the interfacing diagram

B) Draw the interfacing diagram of ADC 0808 to 8051 [4]

SECTION II

Q7) A) Explain how AVR microcontroller is different from 8051 microcontroller [8]

B) Explain the interrupt structure with respect to the following for the At Mega 8535 AVR

1. Number of interrupt sources

2. Vector addresses

3. Response time

4. Priority

5. Enabling and disabling of interrupts [8]

OR

- Q8) A) Explain the memory organization of AT Tiny2383 AVR
B) How the baud rate is set in AVR UART. Explain the different Frame formats supported by the AVR. Also discuss the different I/O registers required for the functioning of serial communication of AVR. [8]

- Q9) A) Write program in assembly language for the AVR to count number of one's and zero's in given byte B4H. Bring number of One's in R19 register and number of zero's in R20 register. [8]
B) Explain RS-485 communication link of AVR. [8]

OR

- Q10) A) Explain the different clock sources that can be connected to AVR [8]
B) Explain the following instructions [8]
a) SBI UCSRA, URDE
b) BRCC Next
c) RET
d) LD R26, -X

OR

- Q11) A) Discuss the design of Data Acquisition System with RS-232 Interface using AVR μ C based on the following points.
a) Block Diagram with explanation
b) Neat interfacing Diagram with explanation
c) A general algorithm [18]

OR

- Q12) A) A Stepper motor to be rotated clockwise by using AVR. Write a using program as well as draw the interfacing diagram. [10]
B) Explain the interfacing of multiplexed 7 segment LED display to AVR with help of neat diagram. [8]

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T.E.(Instrumentation and Control)
Examination - 2013
(2008 Pattern)

Control System Components

Total No. of Questions : 12
[Time: 3 Hours]

[Total No. of Printed Pages :2]
[Max. Marks: 100]

Instructions:

- (1) Answers 03 question from section I Answers 03 question from section II*
- (2) Answers to the two Sections should be written in separate answer- book .*
- (3) Neat diagrams must be drawn whenever necessary.*
- (4) Assume suitable data, if necessary.*

Section I

- Q1. A) Explain following with respect to Solid State Relay. [10]
1. Construction & Working
 2. Various types
 3. Applications
 4. Selection Criteria
- B) Explain Temperature Switch in detail. Give its application. [8]

OR

- Q2. A) Explain contactors with following points [10]
1. Diagram
 2. Working principle
 3. Construction
- B) Explain pressure Switch in detail. Give its application. [8]
- Q3. A) What is meant by an interlock? Explain by giving examples. [8]
- B) What is meant by Braking of motors? Explain any one type in detail. [8]

OR

- Q4. A) Explain with neat sketch jogging/Inching. Give its application. [8]
B) What is meant by Reversing Direction of motors? Explain with neat diagram. [8]
- Q5. A) Explain on delay timers with timing diagram. [8]
B) Explain with neat sketch FRL unit. Give its application. [8]

OR

- Q6. A) Explain 3/2 way valve & 4/3 way valve with diagram. How it is interfaced with double acting Cylinder? [8]
B) Explain with neat sketch working of time delay valve. Draw the Pneumatic circuit using Standard symbols. Give application of the same. [8]

Section II

- Q7. A) Explain in brief metering oil in to the cylinder & metering oil out of a cylinder in Hydraulic systems. [10]
B) Explain Hydraulic power supply in detail. [8]

OR

- Q8. A) Name standard specifications used in the selection of oil used in Hydraulic circuit. [8]
B) With the help of neat sketch explain in the construction & working of pressure relief valve. [10]
- Q9. A) Explain operation & working of Bistable & Proportional Amplifier. [8]
B) Explain operation & working of HRC fuse. State its advantages & disadvantages. [8]

OR

- Q10. A) State the use of Flow Totalizer. Explain any one type. [8]
B) What are different standard ISA sequences for Alarm Annunciator? [8]
- Q11. A) Design & Explain Intrinsic Safety circuit by using Zener Barrier in Hazardous Area. [8]
B) Explain parallel thread pipe fittings along with its application. [8]

OR

- Q12. A) Explain hazardous area & material Classification as per NEC standards. [8]
B) Explain Flanged pipe fitting along with its application. [8]

UNIVERSITY OF PUNE

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T. E. (May Examination 2013)

T.E (Instrumentation and Control)

Electronic Instrumentation

(Course 2008)

[Total No. of Questions: 12]

[Total No. Printed Pages:3]

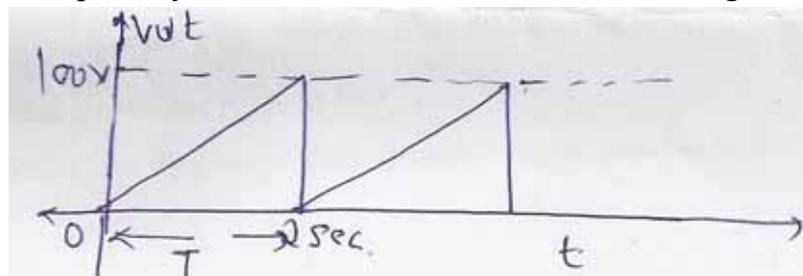
[Time: 3 Hours]

[Max. Marks: 100]

SECTION – I

Q.1 a) Explain working principal TRUE Voltmeter with neat diagram [8]

b) The figure shows a sawtooth waveform applied to the average responding meter. The scale is calibrated in terms of the RMS value of sinusoidal quantity. Calculate the % error in the reading [8]



OR

Q.2 a) What is significance of Q-measurement? What are their applications? [8]

Explain its basic principle of working?

b) Write a short note on Automatic Test Equipment (ATE)? [8]

Q.3 a) Explain the basic principle of working of pulse generator with neat block diagram? [8]

b) Write a short note on arbitrary waveform generator [8]

OR

Q.4 a) Explain pulse characteristics? [8]

b) What is Jitter? Explain various types of Jitter? [8]

Q.5 a) With a neat block diagram of Sampling Oscilloscope. [8]

b) Differentiate between CRO and DSO. [4]

c) Write a short note on CRO probes [6]

OR

Q.6 a) What is the difference between dual trace and dual beam oscilloscope? [9]

In dual trace oscilloscope explain chop mode and alternate mode, comment on selection of above modes.

b) Explain various modes of Digital Storage Oscilloscope [9]

i) Roll Mode ii) Glitch or Runt

SECTION –II

Q.7 a) Explain the following terms related to converters : [8]

i) Accuracy ii) Monotonicity iii) Aperture time iv) Quantization error

b) What are various types of ADC's. With a neat diagram, explain successive approximation type of ADC? [10]

OR

Q.8 a) What are the requirements of ADC in Voltmeters and Multimeters? [10]

Calculate the conversion time of Successive Approximation type of ADC of 16 bits, applied clock frequency is 10 KHz?

b) A control valve has a linear variation of opening as input voltage varies [8]

from 0-5 volt. A microcomputer outputs an 8-bit output word to control valve opening using 8-bit D/A converter to generate the valve voltage

i) Find the reference voltage required for obtaining full valve opening?

ii) Find the % of valve opening for all bit change in the input word?

Q.9 a) What is a universal counter? Explain with a neat block diagram. [8]

b) Explain 1) Totalizing mode 2) Frequency mode [8]

3) Frequency ratio mode

OR

Q.10 a) State and explain the various measurement errors in universal counter [8]

b) Explain the following mode operations with suitable block diagrams [8]

i) Period mode

ii) Time Interval mode

Q.11) Write short notes on: [16]

a) Data logger system with one application

b) Virtual instrumentation

OR

Q.12 a) What is virtual instrumentation? Explain. State any one application in detail. [6]

b) Explain the following : (Any 2) [10]

i) Distortion analyzer

ii) Spectrum analyzer

iii) Wave analyzer

UNIVERSITY OF PUNE

[4363]-197

T. E. (Instrumentation & Control) Examination - 2013

POWER PLANT INSTRUMENTATION

(2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answer any three questions from Section I and any three questions from Section II
- 2 Answers to the two sections should be written in separate answer-books.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Black figures to the right indicate full marks.
- 5 Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6 Assume suitable data, if necessary.

SECTION -I

Q.1	A	Define unit operation & unit process. Explain distillation process with neat sketch.	8
	B	List Various Types of dryer. Explain any one type of dryer with neat sketch	8
OR			
Q.2	A	Explain in brief the selection criteria for solvent to be used for liquid-liquid extraction.	8
	B	Explain Humidification and Dehumidification in detail.	8
Q. 3	A	What is LMTD? Derive the expression for LMTD. Explain U-tube type of heat exchanger with neat sketch	10
	B	Explain forced circulation evaporator with neat sketch	8
OR			
Q. 4	A	List various types of boiler. Explain any one type of boiler with neat sketch	10

	B	Explain the various types of filter used in chemical industry in detail	8
Q. 5	A	Explain the basic components of wind energy conversion system with neat sketch	8
	B	Explain the Importance of instrumentation in thermal power plant.	8
OR			
Q. 6	A	Explain the need and procedure for power factor measurement in power plant.	8
	B	What are the factor affecting the site selection for Hydro Power Plant.	8

SECTION II

Q. 7	A	Explain various boiler drum level control with neat sketch	8
	B	With a neat sketch describe the operation of Rankine steam cycle.	8
OR			
Q. 8	A	Explain Combustion control with neat sketch	8
	B	What is function of super heater in power plant? How they are classified.	8
Q. 9	A	Explain how thermal stress are to be measured and controlled in turbine.	10
	B	Explain power distribution system used in turbine power plant	8
OR			
Q. 10	A	Explain causes of turbine vibration? How affect turbine performance over time. Where do the major losses occur and how they are corrected	10
	B	Does Ion chromatography technique are required in power plant? If yes justify your answer with reason	8
Q. 11	A	Define nuclear reactor, explain radiation containment barriers used in nuclear reactor	8
	B	Explain Tidal power generation system along with its advantages and limitation.	8

OR

- Q. 12 A What is dual fuel engine used in diesel power plant? 10
 Enlist advantages & disadvantages of diesel power
 plant
- B Write a short notes on thermoelectric generator. 6

UNIVERSITY OF PUNE

[4363]-200

T. E. (Instrumentation) Examination - 2013
CONTROL SYSTEM DESIGN (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answers to the *two sections* should be written in *separate answer-books*.
- 2 *Black figures to the right indicate full marks.*
- 3 *Your answer will be valued as a whole*
- 4 *Neat diagrams must be drawn wherever necessary.*
- 5 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6 *Assume suitable data, if necessary.*

SECTION –I

- Q.1 A Design a lead compensator for a control system having 12
OLTF a
- $$G(s)H(s) = \frac{1}{s(s+1)(s+5)}$$
- It is desired to have peak overshoot for a step input is as 25% and settling time is 5 sec.
- B List the various types of compensators. Explain any one 6
with respect to the following points
- 1) Pole-zero location.
 - 2) Its Frequency response.
 - 3) Its Effect on transient and steady state response.

OR

- Q.2 A Design a lag compensator for the system whose open-loop 12
transfer function is
- $$G(s)H(s) = \frac{1}{s(s+1)(s+4)}$$
- So that the static velocity error constant K_v is 5 sec^{-1} , damping ratio is 0.4 and settling time for 5% tolerance is 10 sec..
- B List the various types of compensators. Explain any one 6
with respect to the following points
- 1) Pole-zero location.

- 2) Its Frequency response
- 3) Its Effect on transient and steady state response.

Q. 3 The open-loop transfer function of the uncompensated system is 16

$$G(s)H(s) = \frac{K}{s(s+2)}$$

Design a phase lead compensator for the system so that the phase margin is atleast 45° and $K_v = 12 \text{ sec}^{-1}$ using Bode plot approach.

OR

Q. 4 Apply Bode plot method to design a lag compensator for unity feedback system having. 16

$$G(s) = \frac{K}{s(s+1)(0.5s+1)}$$

Such that P.M. $\approx 38^\circ$, G.M. atleast 10 dB and $e_{ss} = 0.2$ rad for unit ramp input

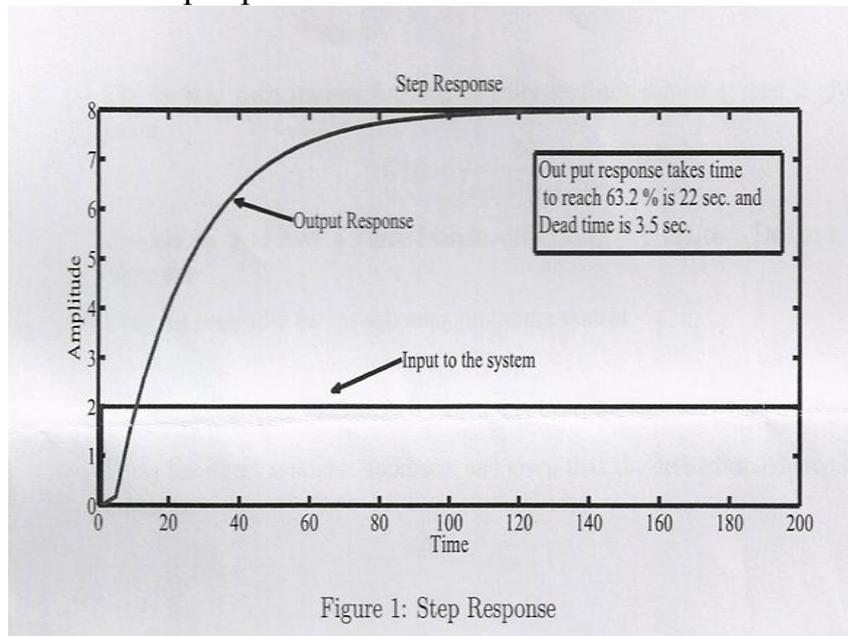
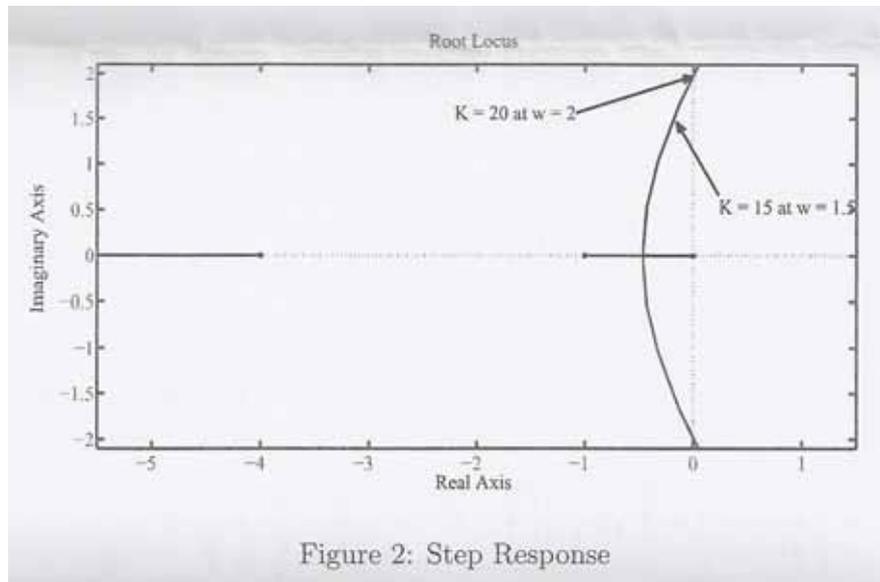


Figure 1: Step Response

- Q. 5 A A step test performed on a process as shown in Fig. 1. Find 12
the parameters for P,PI and PID using Cohen-Coon method.
- B State the setting for P,PI and PID controller tuning in 4
Ziegler Nicholas step response method.



OR

- Q. 6 A The system has root locus as shown in fig.2 The damping factor $\zeta=0$ at $K = 20$ and $\omega= 2$ rad / sec. Find the parameters for P, PI and PID. using Ziegler-Nicholas method 10
- B Explain the characteristics of Proportional, Integral and Derivative control Mode. 6

SECTION II

- Q. 7 A The forward path transfer function of unity feedback control system is given below 9

$$G(s) = \frac{20}{(s+5)(s+3)}$$

The system is to have a Phase Margin = 65° at $\omega = 6$ rad/sec. Design a PI controller

- B Design a controller for the following first order system: 9

$$G(s) = \frac{K_p}{(\tau_p s + 1)}$$

Using the direct synthesis approach, and give that the desired closed-loop behavior is :

$$Q(s) = \frac{1}{(\lambda s + 1)}$$

OR

- Q. 8 A The open loop transfer function of unity feedback control system is given below 9

$$G(s) = \frac{20}{(s+1)(s+2)(s+3)}$$

It is desired to have the closed loop poles at $s = -1.6 + j1.2$. Design PD controller.

- B Design a controller for the following first order system: 9

$$G(s) = \frac{2}{(s+1)} e^{-2.5s}$$

Using the direct synthesis approach, and given that the desired closed-loop behavior is :

$$Q(s) = \frac{1}{(2s+1)} e^{-2.5s}$$

- Q. 9 A State and explain concept of controllability. Determine the state controllability of the system. 8

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & -3 \\ 2 & -5 & 4 \\ -8 & 6 & 7 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 & 2 \\ 1 & -4 \\ 5 & -3 \end{bmatrix} u$$

- B Determine e^{At} using Laplace transform method. 8

$$A = \begin{bmatrix} -1 & -1 \\ 3 & -5 \end{bmatrix}$$

OR

- Q. 10 A State and explain concept of observability of the system Determine the state observability of the system 8

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [3 \ 4 \ 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

- B Determine e^{At} using Cayley-Hamilton Theorem. 8

$$A = \begin{bmatrix} -1 & -1 \\ 3 & -5 \end{bmatrix}$$

- Q. 11 A Consider a system having transfer function 16

$$G(s) = \frac{2}{s^2+3s+2}$$

Find the state space model of the given transfer function. Verify that the system is controllable, If so, Design a state feedback controller using Ackerman's method such that closed-loop poles are at $s_1 = -4, s_2 = -5$

OR

- Q. 12 A Consider a system having transfer function 16

$$G(s) = \frac{6}{s^2+6s+5}$$

Find the state space model of the given transfer function. Verify that the system is observable, If so, determine the observer gain matrix using Ackerman's method to place the observer poles at $s_1 = -4$ and $s_2 = -10$