T.E. Sem VI (CBSGS) Inst.
Rev. 2012.
Process Inst. Sys.

May 2018

Q.P. Code: 24637

Duration: 03 Hrs.   **Total Marks: 80**

Note:

1) Q. No 1 is compulsory .

2) Attempt any THREE questions from Q No 2 to Q No 6.

3) Assume suitable Data wherever necessary.

Q.1) Attempt Any Four   **20M**

a) Explain Selective Control Scheme.

b) Explain in brief PV, SV, CV, MV with reference to Process control.

c) Derive equation for Dead Time process.Give Pade' Approximation.

b) Explain need of Process control .

e) Explain Master Recipe, Control Recipe.

Q. No 2)

a) Explain with a neat sketch working of Hydraulic PD controller.   **10M**

b) Explain working of Single Speed Floating Control Mode.   **10M**

Q. No 3)

a) Explain Different Physical Ladder Diagram Elements.   **10M**

b) What is the objective of Adaptive Control System. Explain Self   **10M**
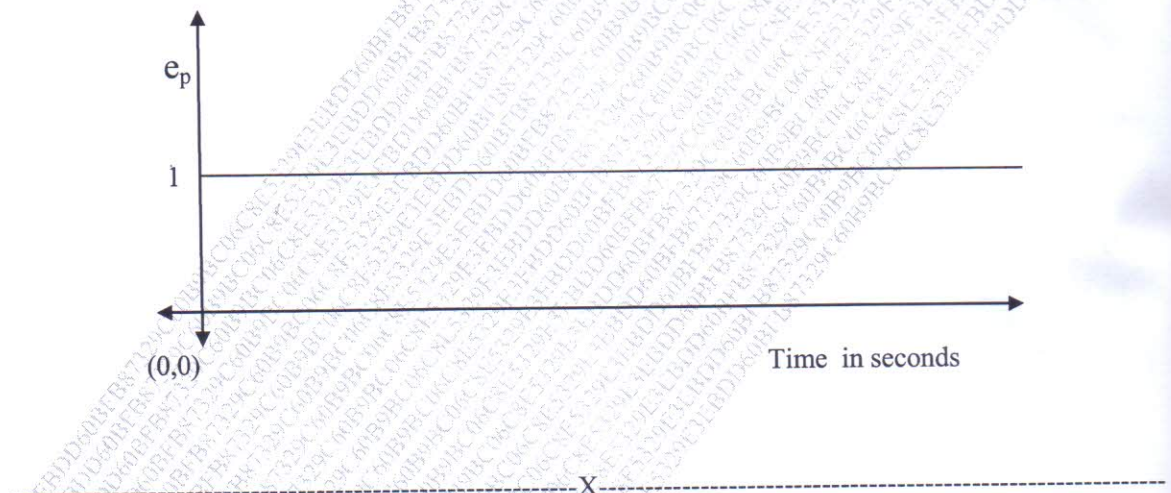Tuning Regulator Method of Adaptive Control .

Q. No 4)

a) Explain in Detail Partial Decoupling and Full Decoupling   **10M**
method with respect to MIMO systems.

b) Explain Feedback & FeedForward control system for Stirred   **10M**
Tank Heater system .

B87329C60B9BC06C8E5329E3EBDD60BF

Q No 5)

    a) Explain One quarter Decay ratio and its significance. Explain   **10M**

       Ziegler- Nichol's and Cohen Coon Open Loop method for tuning.

    b)Prove Proportional control introduces offset in closed loop   **10M**

       with first order process. (Assume $G_f = G_m = 1$).

Q. No 6

    a) Explain Dynamic behavior of First and Second order system.   **10M**

    b) Plot response of P, PI, PD and PID for following error plot.   **10M**

       Kp=1%/%, Ki=1%/(%-seconds) & Kd=1%/(%/seconds).

e_p

1

(0,0)   Time in seconds

--X--

Q.P.Code: 40101

[3 Hours] [Total Marks: 80]

N.B. : 1. Question 1 is compulsory.
   2. Solve any three from remaining
   3. Assume suitable data if required and justify it.

Q.1) Attempt any four   [20]

a. Explain Punch through IGBT
b. Explain class C commutation circuit
c. Write short note on reduction of harmonic distortion.
d. List out advantage and disadvantages of series inverter and parallel inverter.
e. Explain Type B chopper

Q.2) Design a converter to give output voltage 180 V at 1A load current. The   [20]
   input is 230 V 50 Hz ac supply. Use UJT 2N2646. V_{BBmax}= 35 V for
   Vbb=16 V, C=0.1μF , η_{min}=0.56 ,η_{max}=0.75, η_{type}=0.63 Iv =4mA, Ip=25μA
   Consider temperature compensation.

Q.3)
a. Explain variable AC induction motor drive.   [10]
b. Explain basic principle of Dielectric heating. List its advantages and   [10]
   applications.

Q.4)
a. Explain fan regulator using diac-triac scheme.   [10]
b. What are the different PWM techniques? Explain with neat waveforms.   [10]

Q.5)
a. With the help of a neat diagram and associated waveforms discuss the   [10]
   operation of Buck-Boost regulator
b. Explain symmetric semiconverter.   [10]

Q.6)
a. Draw the neat diagram and waveforms and explain Jones Chopper   [10]
b. Explain circuit diagram of full bridge inverter with free-wheeling diode. [10]

Q.P.Code: 40101

[3 Hours] [Total Marks: 80]

N.B. : 1. Question 1 is compulsory.
2. Solve any three from remaining
3. Assume suitable data if required and justify it.

Q.1) Attempt any four [20]

a. Explain Punch through IGBT
b. Explain class C commutation circuit
c. Write short note on reduction of harmonic distortion.
d. List out advantage and disadvantages of series inverter and parallel inverter.
e. Explain Type B chopper

Q.2) Design a converter to give output voltage 180 V at 1A load current. The [20] input is 230 V 50 Hz ac supply. Use UJT 2N2646. V_{BBmax}= 35 V for Vbb=16 V, C=0.1μF , η_{min}=0.56 ,η_{max} =0.75, η_{type}=0.63Iv=4mA, Ip=25μA Consider temperature compensation.

Q.3)
a. Explain variable AC induction motor drive. [10]
b. Explain basic principle of Dielectric heating. List its advantages and [10] applications.

Q.4)
a. Explain fan regulator using diac-triac scheme. [10]
b. What are the different PWM techniques? Explain with neat waveforms. [10]

Q.5)
a. With the help of a neat diagram and associated waveforms discuss the [10] operation of Buck-Boost regulator
b. Explain symmetric semiconverter. [10]

Q.6)
a. Draw the neat diagram and waveforms and explain Jones Chopper [10]
b. Explain circuit diagram of full bridge inverter with free-wheeling diode. [10]

_____

(3 Hours) [Total Marks : 80]

N.B. : (1) Question No. 1 is compulsory.
   (2) Attemt any three questions from the remaining five questions.
   (3) Assume suitable data if necessary.

1. Answer the following any four :— 20
   (a) Find the Z-transform of
       (i) $x(n) = a^n u(n)$
       (ii) $x(n) = -u(-n-1)$
       also specify the ROC.
   (b) For analog transfer function
       $$Ha(s) = \frac{3}{(s+1)(s+2)}$$ Determine H(z) using
       impulse invarient method assume T = 2sec
   (c) If $x(k) = \{8, -2-2j, 0, -2+2j\}$ find the IDFT.
   (d) Difference b/w Linear and circular convolution.
   (e) Define sampling theorm. What are the advantages DSP.

2. (a) Find the DFT of $x(n) = [1\ 1\ 2\ 3]$ using the above result and not otherwise find the DFT 10
   of
       $x_1(n)$ = {1, 0, 1, 0, 2, 0, 3, 0}
       $x_2(n)$ = {1, 0, 0, 1, 0, 0, 2, 0, 0, 3, 0, 0}
       $x_3(n)$ = [1, 1, 2, 3, 1, 1, 2, 3]
   (b) $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$ compute 8 point DFT with Radix-2 DIT FFT algorithm. 10

3. (a) The input sequence $x(n) = [1, 1, 2, -1, 2, -3, -1, 1, 2, 1, -3, -1]$ having the impulse response 10
   of FIR filter $h(n) = \{2, 3, 4\}$ using overlap save method find o/p response.
   (b) Determine the frequency response of the system $y(n) = 0.9y(n-2) + 0.2x(n)$. Find magnitude 10
   and phase response of it.

4. (a) Realize the systme using D.F. II, cascade and parallel realization 5
   $$y(n) = x(n) + \frac{1}{4}x(n-1) + \frac{1}{6}y(n-1) + \frac{1}{6}y(n-2)$$
   (b) $H\left(e^{jw}\right) = e^{-j3w}\left[0.5 + 2.2\cos 3w\right] + \left[1.2\cos 2w + 0.4\cos w\right]$ obtain order and impulse response 5
   of s/m.
   (c) Write a short note on comb filter and notch filter. 10

[TURN OVER

5. (a) Design a digital Butterworth fiture that satisfy the following constraints using Bilinear   1
   transformation.
   Assume T = 1 sec

   $$0.9 \leq H\left(e^{jw}\right) \leq 1 \qquad 0 \leq w \leq 0.25\,\pi$$
   $$H\left(e^{jw}\right) \leq 0.2 \qquad 0.6\,\pi \leq w \leq \pi$$

   (b) A linear phase FIR filure has desired response   10

   $$H_d\left(e^{jw}\right) = 0 \text{ for } \quad -3\frac{\pi}{4} \leq w \leq 3\frac{\pi}{4}$$
   $$= e^{-j2w} \text{ for } \quad 3\frac{\pi}{4} < |w| \leq \pi$$

   Design the filter using Hamming window also draw linear phase realization.

6. (a) Write a short note on 'Decimation by integer factors'.   5
   (b) Explain the application of DSP processor (Texas-320).   10
   (c) If the order of filter N = 2 find the transfer function at IIR filter (poles of IIR filter). 5

(3 Hours) [Total Marks :80]

N.B.:

1) Question no.1 is compulsory.

2) Attempt any three questions out of remaining five questions.

3) Assume suitable data if necessary.

1   Solve following   20

   a   Explain the structure of STATUS (Flag) register of PIC18F.

   b   What are the registers associated with PIC18F452 ports? Describe the role of each in brief?

   c   Explain the following instructions of PIC18F with example
a. SETF   b. BTFSS c. RRNCF   d. CPFSEQ

   d   Define embedded system? List any four characteristics of it.

   e   Write a program to multiply two 8-bit numbers

2   a   Draw a diagram to Interface 4 x 4 matrix key board to PIC 18F   10
and explain logic to identify which key is pressed.

   b   Draw an interfacing diagram to connect 16 x 2 LCD Module to   10
PIC18. Write a Program to display 'WELCOME' on it.

3   a   Explain the working of CCP module of PIC18F?   10

   b   Write a program to generate a square wave using timer, on RC0   10
pin, assume clock frequency is 16MHz.

4   a   Write a program to convert ASCII number to BCD number with   10
flowchart.

   b   What is a task? Explain various task scheduling algorithms.   10

5   a   Explain the process of transmitting a character with serial   10
communication module of PIC18F. Write a program for the same.

   b   What are different design metrics of embedded system? Explain.   10

TURN OVER

A6F5D93F0C8CFDF3A3CB9DC440389B1D

6 a Explain the working of I2C communication bus. 10

b Explain the ADC module of PIC18F . 10

PIC18F4520 SFRS

Reg. Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
INTCON	GIE/GIH	PEIE/GIEL	TMR0IE	INT0IE	PBIE	TMR0IF	INT0IF	RBIF
INTCON2	RBPU	INTEDG0	INTEDG1	INTEDG2	-------	TMR0IP	--------	RBIP
INTCON3	INT2IP	INT1IP	--------	INT2IE	INT1IE	------	INT2IF	INT1IF
T0CON	TMR0ON	T08BIT	T0CS	T0SE	PSA	T0PS2	T0PS1	T0PS0
T1CON	RD16	T1RUN	T1CKPS1	T1CKPS0	T1OSCEN	T1SYNC	TMR1CS	TMR1ON
T2CON	—	T2OUTPS3	T2OUTPS2	T2OUTPS1	T2OUTPS0	TMR2ON	T2CKPS1	T2CKPS0
ADCON0	— —	---	CHS3	CHS2	CHS1	CHS0	GO/DONE	ADON
ADCON1	_____	—	VCFG1	VCFG0	PCFG3	PCFG2	PCFG1	PCFG0
ADCON2	ADFM	___	ACQT2	ACQT1	ACQT0	ADCS2	ADCS1	ADCS0
TXSTA	CSRC	TX9	TXEN	SYNC	SENDB	BRGH	TRMT	TX9D
RCSTA	SPEN	RX9	SREN	CREN	ADDEN	FERR	OERR	RX9D
IPR1	PSPIF	ADIF	RCIF	TXIF	SSPIF	CCP1IF	TMR2IF	TMR1IF
IPR2	OSCFIF	CMIF	___	EEIF	BCLIF	HLVDIF	TMR3IF	CCP2IF
PIE1	PSPIE	ADIE	RCIE	TXIE	SSPIE	CCP1IE	TMR2IE	TMR1IE
PIE2	OSCFIE	CMIE	___	EEIE	BCLIE	HLVDIE	TMR3IE	CCP2IE
PIR1	PSPIP(1)	ADIP	RCIP	TXIP	SSPIP	CCP1IP	TMR2IP	TMR1IP
PIR2	OSCFIP	CMIP	___	EEIP	BCLIP	HLVDIP	TMR3IP	CCP2IP

_____

Q.P. Code: 36590

[Time: Three Hours]   [Marks:80]

Note:

1. Question No.1 is compulsory
2. Solve any THREE questions out of remaining FIVE questions.
3. Figure to the right indicate full marks.

1. Answer the following :-   (20)
   a) Explain Menchester coding.
   b) Compare H1 and HSE segment of foundation Field bus
   c) What are the different types of network topologies.
   d) Which standard is used for:
      i)Wireless LAN   ii GPRS   iii Bluetooth   iv ZigBee
   e) What are the criteria to be considered to establish a good network?

2. Answer the following:-

   a) Draw and explain the OSI reference model in detail.   (10)
   b) Explain the following network components and state in which layer of OSI   (10)
      model each of them work:
                i)   Bridge
               ii)   Hub
              iii)   Router
               iv)   Gateway
                v)   Switch

3. Answer the following:-

   a) What is MODBUS and MODBUS Plus?   (10)
   b) Describe PROFI BUS-DP in detail.   (10)

4. Answer the following :-

   a) Discuss the OPC architecture with suitable diagrams.   (10)
   b) Explain the method of implementing field bus in safe and hazardous area.   (10)

5. Answer the following:-

   a) Explain the architecture of HART.   (10)
   b) What is satellite communication? Define uplink and downlink frequency?   (10)

6. Write short notes on   (20)
   a) GPIB
   b) Data Highway Plus
   c) CAN protocol
   d) RS232,RS422

****

E60CFC45F2172FDF02888C8F24AA04ED

Q.P.Code: 50717

03 Hours   Total Marks: 80

Note: 1) Question **No. 1** is **compulsory**.
2) Answer any **three questions** from the remaining **five questions**.
3) Illustrate answers with **sketches** wherever **required**.
4) **Figures** to the right indicate **marks**.

Q1. Answer the following: 20

   a) Draw the general block diagram of analytical Instrument and explain.
   b) Define chemical shift and explain its significance in NMR Spectrometry.
   c) Explain interference filters used in the absorption instruments.
   d) What are the units of Radioactivity? Explain half-life period.

Q2. a) What is meant by Raman Effect? List the characteristic properties of Raman lines.

     Draw and explain the constructional detail of Raman spectrometer.   10

   b) Explain differences between atomic absorption and atomic emission spectroscopy.   10

Q3. a) Explain Magnetic deflection type Mass spectrometer with neat diagram.   10

   b) When does magnetic resonance occur? Explain working of NMR Spectrometer.   10

Q4. a) Give classification of chromatograph. List the parts of GC. Draw and explain the

     working of GC.   10

   b) With a neat schematic diagram, explain Scintillation counter.   10

Q5. a) Explain the basic components of Instrumentation for x-ray spectroscopy with

     a neat diagram.   10

   b) With a neat diagram, explain Double beam spectrometer.   10

Q6. Write short note on: 20

   a) Photomultiplier tube

   b) GC-MS

   c) Oxygen analyzer

   d) GM counter

_____

8463BEBB1C5F90DFF79EFBBFAB147ADE