T.E. Sem V (CBGS) ETRX. 4/12/14.

SBS.

QP Code : 14933

(3 Hours) **[Total Marks : 80**

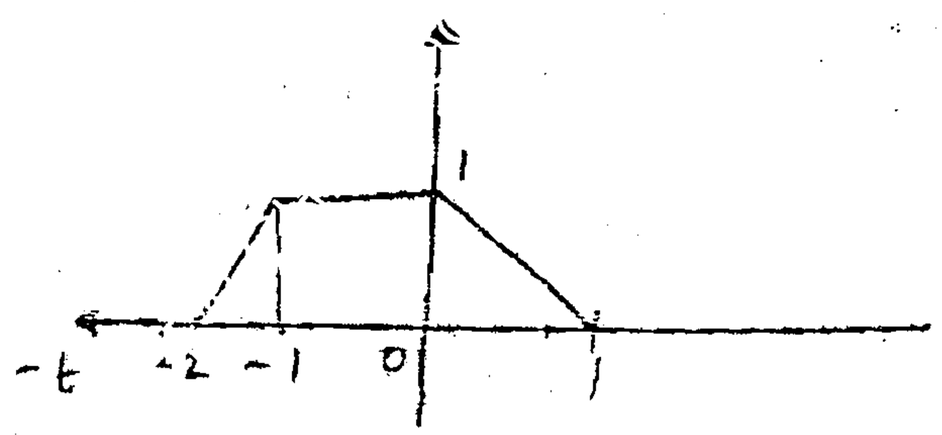
N.B : (1) Question No.**1** is **compulsory**.
(2) Attempt any **three** questions from the remaining questions.
(3) **Solve** every question in a serial order.

1. (a) Prove differentiation property of Z.Transform. **20**
(b) Check if the system is Linear and time invariant.
(i) $y(t) = t^2x(t) + 3$
(ii) $y(n) = x(-n) + 3x(n+1)$
(c) Prove Time shift property of Laplace Transform.
(d) Determine energy or power of the following signals.
(i) $x(t) = 5u(t)$
(ii) $x(n) = 10\, n\, u(n)$.
(e) State Initial and final value Theorem of Z. Transform and Laplace Transform.

2. (a) Determine h(n) for all possible ROC condition. **10**

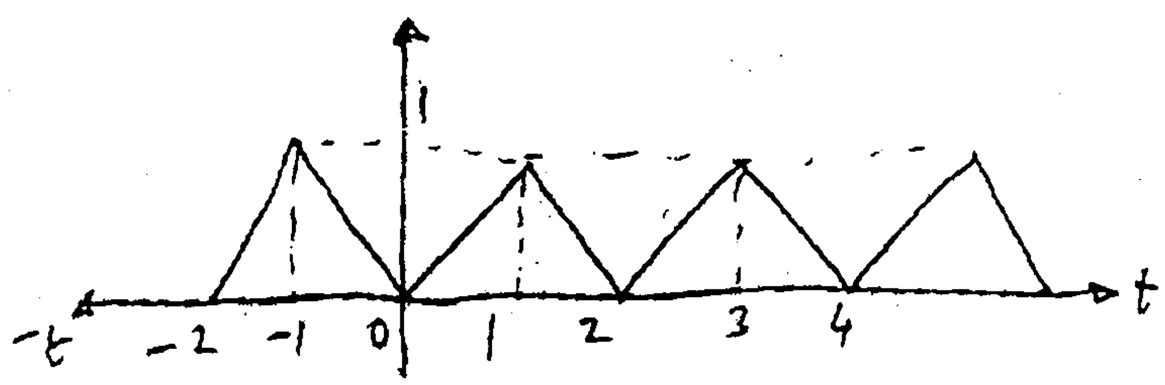
$$H(z) = \frac{z\left(z^2 - 3z + 11\right)}{\left(z - \frac{1}{4}\right)(z-4)(z+6)}$$

plot all the ROC's, poles and zeros also comment on stability at the system.
(b) Obtain even and odd parts of the signal. **5**



Also obtain and plot :
(i) $x_{even}(2t-1)$
(ii) $x_{odd}\left(\frac{t}{2}+1\right)$
(c) Determine Fourier transform of a signum signal. **5**

3. (a) Obtain Fourier series of the following signal. 8

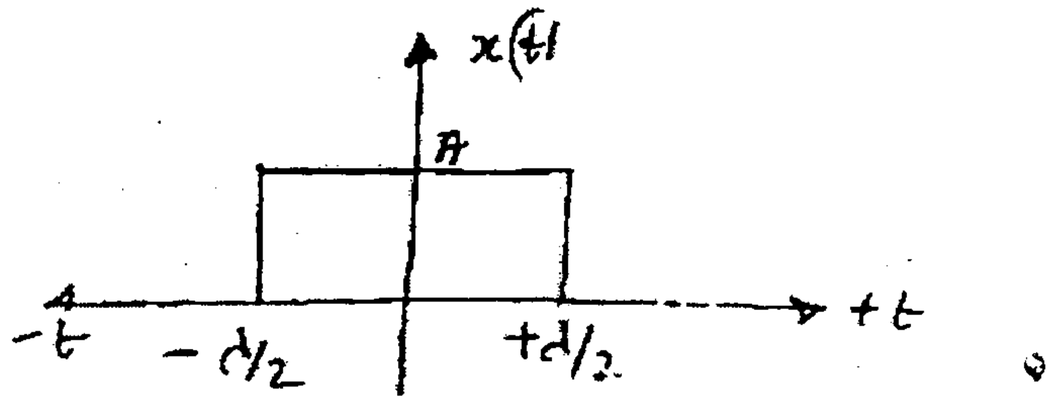


(b) Obtain Linear convolution of 6

$x(n) = 3\delta(n+3) + 2\delta(n+1) + \delta(n) - \delta(n-1)$

$h(n) = 2\delta(n+2) - 3\delta(n) + 2\delta(n-1) + 4\delta(n-2)$.

(c) Obtain Fourier transform of a rectangular pulse. 6



4. (a) A DT. LTI system is specified by 10

$y(n) = -7y(n-1) - 12y(n-2) + 4x(n-1) - 2x(n)$

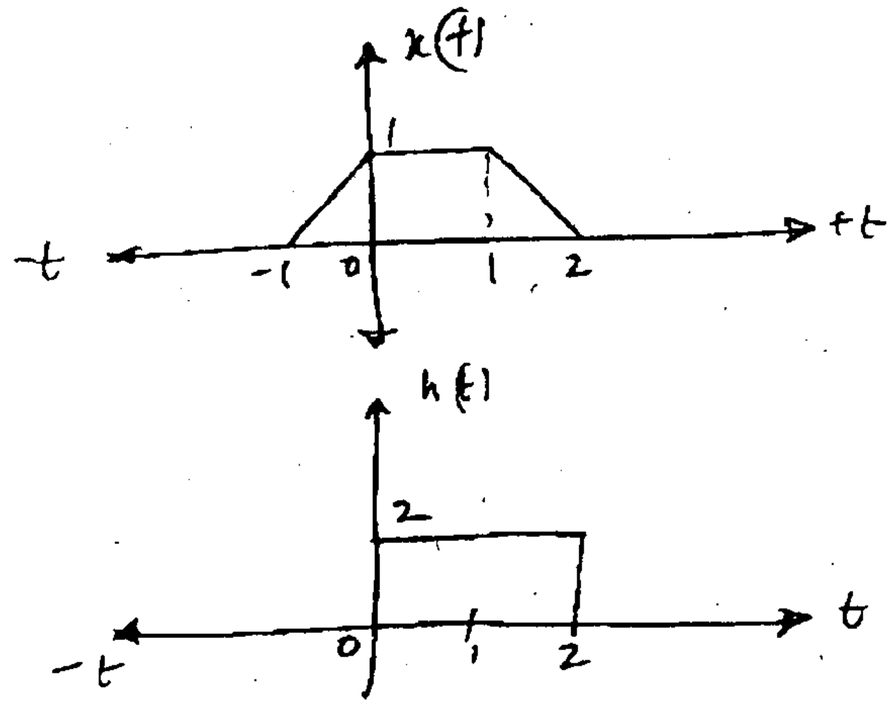
$y(-1) = -2$ $y(-2) = 3$.

Determine (a) Zero input respouse

(b) Zero state response if $x(n) = (6)^n u(n)$

(c) Total response of the system.

(b) Obtain $y(t) = x(t)*h(t)$ using graphical convolution 10



10

5

5

6

5. (a) Obtain output response of a third order C.T. LTI non-realxed system.

$$\frac{d^3y(t)}{dt^3}+\frac{8d^2y(t)}{dt^2}+\frac{17dy(t)}{dt}+10y(t)=\frac{d^2x(t)}{dt^2}-\frac{3dx(t)}{dt}+7x(t)$$

If $y(0) = -0.5$

$y'(0) = 2$

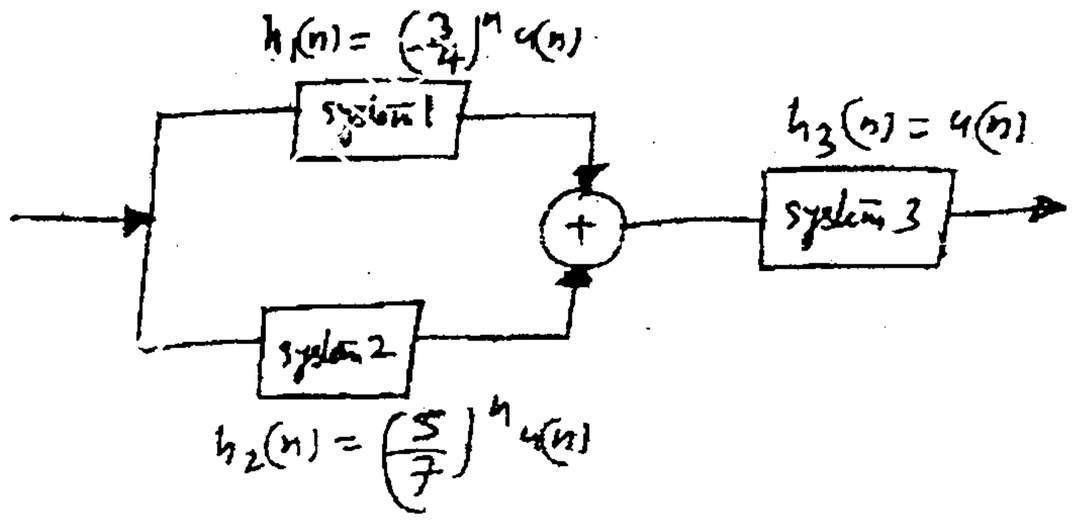
$y''(0) = -1$

(b) Determine Z. Transform of $x(n) = (a)^n \sin[\Omega_0 n]\, u(n)$ using properties of Z.T.

(c) Obtain auto-correlation of $x_1(t)=4e^{-3t}u(t)$ 6

6. (a) Obtain overall impulse response signal of the interconnected system.

8



(b) Obtain Laplace Transform of

(i) $x(t) = e^{-9t}\, u(t) + e^{+6t}\, u(-t)$

(ii) $x(t) = (t-1)\, u\,(t-2) + tu(t)$

(c) Prove Parsavel's Theorem of Fouirer Transform and Fourier Series.

T.E. ETRX sem V (CBGS). 28/11/13.

~~Microcontrollers~~ µcontrollers & appl^ns

QP Code : 14898

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No. one is compulsory.
(2) Attempt any three from remaining five questions.

Q1). a) Explain program status word of 8051 microcontroller in detail. (5)
b) Describe the TCON, TMOD SFR? (5)
c) Explain the ARM7 pipeline mechanism (5)
d) What are the statuses of Condition Flags in Logical & Arithmetic Instructions? (5)

Q2. a) What are the different addressing modes of 8051 microcontroller? Explain each with suitable examples. (10)
b)Explain various timer modes available in 8051 microcontroller in detail. (10)

Q3). a) Describe the interrupt structure of 8051 in detail. (10)
b) Explain the following instructions of 8051 with examples. (10)
i) CJNE destination,source, label ,ii) MUL AB , iii) INC @Rp
iv)SWAP A , v) SETB P2.0

Q4). a) Explain ARM Processor modes (10)
b) Explain various ARM processor exceptions & interrupts with its vector locations (10)

Q5). a) Explain how the ARM instruction set suitable for embedded applications (10)
b) Explain the following instructions of ARM processor (10)
i) TSTEQ r2, #5 ; ii) CMP r0, r1 ; iii) BICEQ r2, r3, #7 :
iv) MVNEQ r1,#0 ; v) STR r0, [r1,#12]

Q6).a) Create a Square wave of 50% duty cycle over a pin P1.5 with 2 Khz frequency (Assume Crystal frequency = 12 Mhz) (10)
b) Write an 8051 assembly language program to find largest number among five 8-bit numbers? (10)

T.E. ETRX Sem V (CBGS). 24/11/14.

DLIC.

QP Code :14855

(3 Hours) **[Total Marks : 80**

N.B. : (1) **Question** No. **one** is **compulsory**.
(2) **Solve** any **three** questions from remaning.
(3) **Assume** suitable data if **necessary**.
(4) **Figures** to the **right** indicate marks.

1. (a) Design Inverting op-amp circuit for voltage gain 10. what care should be taken to operate it linearly. **4**
(b) Design a differentiator to differentiate the input signal that varies in frequency from 10 Hz to 1 kHz. **4**
(c) Compare zero crossing detector with schmitt trigger circuit. **4**
(d) What are the specifications of DAC ? **4**
(e) Design a circuit to keep LED 'ON' for 20 seconds once circuit is triggered. **4**

2. (a) Define the following . **10**
(i) Slew rate
(ii) CMRR
(iii) Input offset voltage
(iv) Output offset voltage
(v) PSRR

2. (b) Draw neat diagram of Instrumentation Amplifier using op-amp and hence derive the equation of output voltage. **10**

3. (a) Give complete procedure to design schmit trigger circuit and hence design it for UTP = 0.5 V and LTP = -0.5 V. **10**

(b) Explain 4-bit successive approximation type ADC. **10**

4. (a) (i) Give design proecedure of first order HPF. **3**
(ii) Draw functional block diagram of IC 8038. **3**
(iii) What is the basic and performance parameter of sample and hold amplifier circuit ? **4**

4. (b) Design RC phase shift oscillator to produce a sinusoidal frequency output of 5 kHz. **10**

5. (a) Design triangular waveform generator for frequency of 5 kHz and Vopp = 6 V using op-amp. **10**

5. (b) Compare normal regulator with SMPS, explain any one circuit of SMPS. **10**

6. (a) Design voltage regulator using IC 723 to give V_0=5V and output current = 2A **10**
(b) Explain in detail about frequency multiplier and application of PLL. **10**

GN-Con.:7737-14.

T.E Sem V (CBGS) ETRX. 10/12/14.
DCOM.

QP Code : 17949

Duration: 03 hours Total marks : 80

N.B. : 1) Question no. 1 is compulsory
2) Attempt **any three** questions out of the remaning five questions
3) Assume suitable data if required, stating them clearly.

Q. 1 Answer the following questions: (20)
(a) Compare BASK, BFSK & BPSK based on following parameters:-bandwidth requirement, noise immunity, efficiency & applications.
(b) State and explain Shannon's theorem for channel capacity.
(c) Explain a decoding scheme which prevents error propagation in a duo-binary system.
(d) Differentiate between MSK and offset QPSK.
(e) Draw signal constellation diagram for 16–ary QASK and find its Euclidian Distance .

Q.2 (a) Explain the significance ISI in digital communication system. How is it caused? How it can be avoided? Derive the expression for Nyquist's condition for Distortion-less transmission. (10)

(b) A discrete memory less source has in alphabet of fine symbol with their probabilities as shown below: (10)

Symbol	S1	S2	S3	S4	S5
Probability	0.15	0.11	0.19	0.40	0.15

(i) Construct Huffman Code for each symbol and determine following parameters: Entropy, Average Code word length, Code Efficiency and Code Redundancy
(ii) determine the above parameters for Shannon-Fano code

Q.3. (a) The Generator vectors for a convolution encoder with code rate 1/3 are
g1 = 110, g2=101 , g3= 111
(i) Draw Encoder diagram and determine code word for input vector (10111)
(ii) draw trellis diagram and state diagram (10)
(b) Justify that MSK is a frequency shift keying with relevant expressions. (5)
(c) Explain the working of Matched filter in communication receiver (5)

Q.4 (a) If a data bit sequence is 101100111010 , Draw (i) offset and non offset QPSK waveforms, (ii) BFSK waveform (6)

(b) Write the mathematical expression of DPSK transmitted signal and explain DPSK transmitter and receiver. Draw the DPSK waveform for the sequence given in 4(a). (8)

(c) Explain Duo binary encoder –decoder. Show how the given sequence 1100101001 is recovered at the receiver . (6)

Q. 5 (a) A **(7,4) cyclic code** is generated using the polynomial $g(x)=(1+x+x^3)$

(i) Generate the systematic cyclic code for the data **1001 and 1010(MSB)** by long division method

(ii) Draw the encoder & show how codewords are generated for the same data given above,by tracing the path through the encoder and verify the result (10)

(b) With respect to **8-ary PSK,** explain the following:

(i) block diagram of transmitter and receiver

(ii) mathematical expression of the transmitted signal

(iii) sketch its PSD and indicate its bandwidth

(iv) draw its signal space diagram and find its Euclidian distance (10)

Q. 6 (a) What is spread spectrum modulation ? Bring out the significance of PN Sequence. Explain Direct sequence Spread Spectrum, DS-BPSK . Write the expressions for Processing gain and Jamming Margin (10)

(b) With a neat diagram, explain the working of Integrate and Dump Receiver. Derive the expression for its Probability of error. (10)

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T. E. Sem V (CBGS) 18/11/14

ETRX -
Electromagnetic Engg

QP Code : **14818**

(3 Hours) **Total Marks : 80**

N. B. : (1) Question **No.1** is **compulsory.**
(2) Solve any **Three** questions form remaining **five** questions.
(3) Draw a **neat** and **clean** diagram whenever **necessary.**
(4) Assume **suitable** data if **required**.

1. Answer the following (**any four**) 20
   (a) What do you understand by conservative field.
   (b) Derive wave equations for time harmonic fields.
   (c) The radiation resistance of antenna is 72Ω and the loss resistance is 8 Ω. Calculate its directivity in dB if the power gain is 16.
   (d) Explain the important advantages and drawback of FDM.
   (e) Define critical frequency, MUF and OWF.

2. (a) State and Explain Maxwell's equations in differential and internal form for statie field. 8
   (b) A 10 GHz plane wave travelling in free space has an amplitude of 8
   E_x =10V/m
   Find - (i) The phase constant
   (ii) Intrinsic impedance and
   (iii) The amplitude and the direction of H
   (c) Explain the operating modes of helical antennas. 4

3. (a) Explain the mechanism of ionospheric propagation. A high frequency radio link has to be established between two points at a distance of 2000 km. on the earth's surface. Considering the height of 200km and critical frequency of 5MHz. Calculate MUF for given path. 8
   (b) Derive an expression for radiation resistance of an infinitesimal dipole antenna and explain its significance. 8
   (c) Derive Laplace's and Poisson's equations. 4

4. (a) Find the transmission and reflection coefficients at the boundary for normal incidence. Given that for region 1: μ_{r1}= 1, ϵ_{r1}= 9 and for region 2 is a free space. Consider the perpendicular polarization. 8
   (b) Derive an expression for vector magnetic potential wave equation. 8
   (c) Explain the physical significance of the terms α, β and γ related to wave propagation in lossy dielectrics. 4

5. (a) Give the comparison of FDM, FEM and MOM. 8
   (b) Determine the Poynting vector theorem and explain the power flow terms due to the time varying fields. 8
   (c) The height of monopole anternna is $\lambda/100$ what is the radiation resistance. 4

6. Write short notes on- 20
   (a) Boundary conditions for static **E** and **M** fields.
   (b) Polarization of waves.
   (c) Antenna parameters.
   (d) Space wave propagation

GN-Con. 5623-14.