T.E - V - E I R X - C B S G S.
Digital Communication
Dec-2015

11/12/15

QP Code : 5731

(3 hours ) Total marks : 80

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

Q. 1 **Answer the following questions: (any four)** (20)
(a) State Shannon s theorem for Channel capacity. State Shannon's limit.
(b) What is ISI ? How is it caused? Compare ISI with ICI.
(c) What is a Matched Filter? List the properties of Matched filter.
(d) Sketch the BPSK and DPSK waveforms for the data stream given by 1100011101110 .
(e) What are the desirable properties of Line codes? Explain atleast five.

Q 2 (a) A discrete memory less source emits six messages with their probabilities as shown below: (10)

| Symbol | S1 | S2 | S3 | S4 | S5 | S6 |
|---|---|---|---|---|---|---|
| Probability | 0.11 | 0.13 | 0.16 | 0.31 | 0.23 | 0.06 |

(i) Using Huffman Code , find the Entropy of the source. Obtain the compact binary code and find the Average length of the Code, Code Efficiency and Code Redundancy
(ii) determine the above parameters for Shannon-Fano code

(b) Explain Duo binary encoder- decoder with a neat sketch. What is the significance of Precoder in it.? Using Precoder, show that the input bit sequence 11011001 can be properly recovered at the receiver. (10)

Q.3 (a) Answer the following briefly: (any three) (12)
(i) Compare OQPSK and MSK
(ii) Explain the Significance of Equalizer in digital communication system
(iii) Why MSK is called 'shaped QPSK'?
(iv) compare Linear block code and convolutional codes.

(b) Consider a Systematic block code whose Parity check equations are:
$p_1 = m_1 + m_3 + m_4$
$p_2 = m_1 + m_2 + m_4$
$p_3 = m_1 + m_2 + m_3$
$p_4 = m_2 + m_3 + m_4$ where $m_i$ are message bits and $p_i$ are parity check bits.

(i) find the value of n, k, as well as 'G' and 'H' matrices for this code.
(ii) find the codewords for the msg vectors : 1001, 1101
(iii) how many errors can the code correct and detect?
(iv) If the received codeword is 10011101, find the syndrome. (8)

Q.4 (a) With reference to 8-PSK, explain the following:
(i) transmitter and receiver with a neat block diagram along with mathematical expression for transmitted signal
(ii) Compare it with QPSK and BPSK
(iii) sketch its PSD indicating the bandwidth
(iv) draw its constellation diagram and find its Euclidian distance (3+3+2+2)

(b) Design a Feedbck shift register encoder for a (8,5) cyclic code with generator Polynomial $g(x) = (1 + x + x^2 + x^3)$.
(i) Find the codeword for the msg 10101, by tracing the path through the encoder in systematic form.
(ii) draw the syndrome calucalator for the same and find the syndrome if the received codeword is 11011101 (5 +5)

Q.5 (a) With a neat diagram, explain how the Integrate and Dump Filter works as baseband Receiver. Draw the output waveform for a input of rectangular pulses. Derive the expression for its probability of error. (10)

(b) For a convolutional encoder with code rate 1/3 and constraint length 3 and generating Vectors g1= ( 1 1 1) , g2= ( 1 0 1) , g3= ( 1 1 0).
(i) draw the encoder and find the codeword for the input sequence 10101.
(ii) Sketch its state diagram and Trellis diagram (10)

Q.6 (a) Draw the signal constellation diagram for 16-PSK and determine its Euclidian distance . Compare it with that of 16-QASK .which of them has better noise immunity? (8)

(b) For the bit sequence, 10110101100 ,draw the MSK waveform (let m=5) (6)

(c) Explain with a neat diagram, Frequency hopping spread spectrum, FH-MFSK and explain Slow hopping and Fast hopping . how FH-SS is different from DS-SS ? (6)

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T.E- V - ETRX - CBSGS.
Signals & Systems
Dec-2015
07/12/15

QP Code : **5690**

(3 Hours) [ Total Marks : 80

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

1. Attempt **any four :**
   a) What is Sinc(x) function? Plot graphically Sinc(x) functin for the range of x : -2.5<x<2.5 — 5
   b) Obtain DTFT and plot the manitude and phase response of h(n) = {0,1,1,1} — 5
   c) Distinguish between power signals and energy signals. Is $x(t) = \cos^2(w_0 t)$ is energy signal or power signal? Find its normalized energy or power. — 5
   d) State and prove differentiation of Z-transform. — 5
   e) Check whether the following system is linear, time variant, casusal or otherwise : y(n) = x(n) + n*x(n+1) — 5

2. a) Find the response of the system — 10

$$x(t) = \frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t)$$

Subject to the initial conditions y(0) = 2, y(0) = 1 and input $x(t) = e^{-t}u(t)$.

   b) Find and sketch the Even and Odd components of the following: — 5
$x(t) = t, \quad 0 \le t \le 1$
$x(t) = 2-t, \quad 1 \le t \le 2$

   c) State and prove frequency shift property of the Fourier transform. — 5

3. a) Compute the convolution y(n) = x(n) * h(n) where X(n) = {1,1,0,1,1} and h (n) = {1,-2,-3,4} — 8
   b) Find Inverse Z-transform of the following: — 8

$$X(Z) = \frac{2Z^2 + 3Z}{Z^2 + Z + 1};$$ if x(n) is causal.

   c) Define ESD and PSD. What is the relation of ESD and PSD with autocorrelation? — 4

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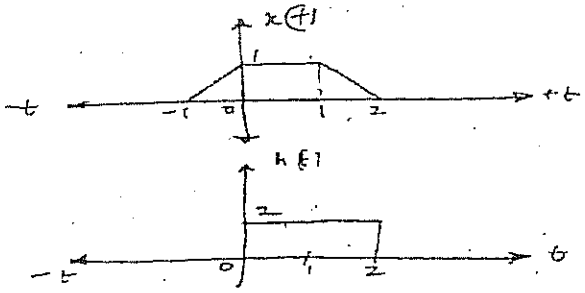
4. a) 


10

Find $y(t) = x(t)*h(t)$ of the signal shown above using graphical convolution. 5

b) Obtain system function H(z) for

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

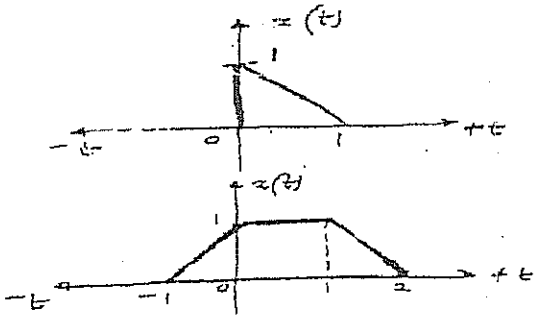
Determine the poles and zeros and draw a pole zero plot. 5

c) Obtain DTFT and plot the manitude and phase response of $h(n)=\{2,1,2\}$

5. a) Determine the Z transform and sketch ROC 10

1) $x_1[n]=\left[\frac{1}{3}\right]^n ; n \geq 0$

2) $x_2[n]=x_1[n+4]$

b) 


5

Obtain Laplace transform by using properties of Laplace transform only. 5

c) Determine Fourier transform of signum signal

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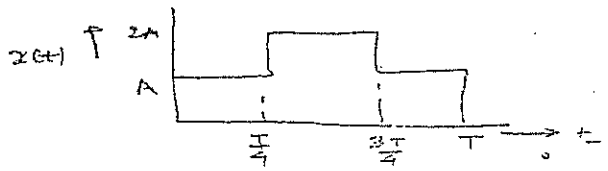
6. a) Obtain initial Laplace transform of $X(s) = \frac{2s^2 + 5s + 5}{(s+2)(s+1)^2}$ for all possible ROC conditions. 10

b) Obtain Fourier transform by using properties of Fourier transform only. 10



T.E - V - E I K X - 4 B S G S

Micro Controller and Applications.

NOV - Dec 2015

1/12/15

**Q.P. Code : 5647**

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

N.B. 1. Question No 1 is compulsory.
2. Attempt any three from the remaining five questions.

Q1. Attempt any four from following. (20)
a) Draw and explain CPSR of ARM 7 TDMI
b) Explain the concept of pipeline of ARM 7 TDMI. State its advantages and disadvantages.
c) Describe TCON and TMOD SFR's in 8051.
d) Interface 8 LED's with 8051.Draw detail interfacing diagram.
e) Explain PSW of 8051 in detail.
f) Write a program to convert Hexadecimal number into Decimal number

Q2. a) Explain and draw memory organization of 8051. (10)
b) Explain Interrupts and exceptions of ARM 7 TDMI. (10)

Q3. a) Assume the XTAL = 11.0592 Mhz for 8051. Write a program to generate square wave of 1 kHz On pin P1.3 of 8051. (10)
b)Explain addressing modes of ARM 7 TDMI with suitable example. (10)

Q4. a) Design 8051 based system for following specifications (15)
1. 32 KB RAM using 16 KB RAM.
2. 32 KB RAM using 16 KB ROM.
Show detail memory mapping. And draw interfacing diagram in detail.
b) Differentiate between ARM state and THUMB state. (5)

Q5. a) Explain addressing modes of 8051 with suitable example. (10)
b) Explain in detail ARM processors operating modes. (10)

Q6. Write a short note on any two. (20)
a) How to double the baud rate in 8051? Write a program to transfer letter "M" serially with The baud rate of 9600.
b) Interface a 8 bit ADC with 8051. Draw detail interfacing diagram and also write program for the same
c) Explain following instruction related to ARM 7 TDMI.
1. MVN r0,r1, LSL #2
2. CMP r5, r3
3. STMIA r9!,[r0,r1,r2]
4. TST r4,r5
5. LDR r0,[r1+r2]
d) Interface a stepper motor with 8051. Draw detail diagram and also write program for the same.

T.E- V - ETRX- CBSGS.
Design with Linear Integrated Circuits 24/11/15
Nov-Dec '15.

Q.P. Code : **5606**

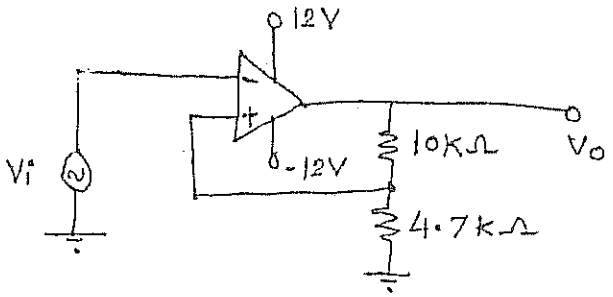
(3 Hours) [Total Marks : 80

N.B. : (1) Question No.1 is **compulsory**.
(2) **Attempt** any **three** questions from remaining five questions.
(3) Assume **suitable** data if **required**.

1. Solve any **four** from the following :
   (a) What do you mean by Input Bias current of an op-amp, How it can be measured practically. What should be its value ideally. 5
   (b) How to avoid false triggering in electronics, draw suitable diagram and explain with neat waveforms. 5
   (c) Assume that you have to use ADC with microcontroller, before using it which performance parameters of ADC you need to study. 5
   (d) What are the features of Regulator IC LM 337, Design voltage regulator using LM 337 to give output voltage of -7 volts. 5
   (e) Explain Inverting mode current amplifier circuit using op-amp. 5
   (f) What are the features of Multiplier IC 534, explain one of its application. 5

2. (a) State the important ideal characteristics of an op-amp, compare it with the values of IC 741 op-amp. 10
   (b) Design a wide band reject filter having $f_H$ = 400 Hz and $f_L$ = 2 kHz with a pass band gain of 2, Also draw frequency response of it. 10

3. (a) For the circuit shown below. Calculate the trigger points if supply voltage V = ±12V, Plot the output voltage Vo if Vi is a 100 Hz triangular wave of magnitude ±10V. 10




   (b) What are the features of Instrumentation amplifier, Draw neat diagram of three op-amp instrumentation amplifier and hence derive equation of output voltage. 10

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4. (a) Explain the working of R/2R ladder D/A converter. 10
(b) What are the features of LM 380 Power Amplifier, explain any two applications of it. 10

5. (a) Design voltage Regulator to give Vo = 9V at 600 mA using IC 723. 10
(b) Explain how IC 555 can be used as PWM. 5
(c) Explain Precision Half wave rectifier. 5

6. (a) Explain the Astable mutivibrator using op-amp. 10
(b) Explain current voltage converter using op-amp and hence state applications of it. 5
(c) What are the features of IC 78XX. Design voltage regulator using IC 78XX for Vo = 20V. (Adjustable Regulator). 5

T.E - I - ETRX - CBSGS.
Electromagnetic Engineering.
Nov-Dec'2015.

18/11/15

QP Code : 5564

(3 Hours) [ Total Marks : 80

N.B. : (1) Question no 1 is **compulsory**
(2) Solve **any three** from Question no 2 to Question no 6
(3) Assume suitable data if required .
(4) Right **figures** indicate the **marks**

1. Attempt **any four** :
   (a) State and explain coulomb's law 5
   (b) derive poisson's and laplace equation. 5
   (c) What is intrinsic impedance of free space? 5
   (d) Define directive gain and directivity with respective antenna. An antenna has a directivity of 20 and a radiation efficiency of 90%.compute the gain in dBs. 5
   (e) Find out the divergence and curl of the following function 5

$$\overline{A} = 2xy\overline{ax} + (x^2 z)\overline{ay} + z^3\overline{az}$$

2 (a) Given the potentials $V=2x^2y-5xz$ and a point P(-4,3,6) find V,E,D and $e_v$ at point P 10
(b) Derive boundary conditions for electric fields at the boundary of two dielectric media 10

3. (a) Derive Maxwells integral and point form equations for time varying fields 10
   (b) Prove $\nabla . \overline{D} = e_v$ 10

4. (a) In a media characterized by $\sigma = 0, \mu = \mu_0$ and $\varepsilon = \varepsilon_0$ 10

$$\overline{E} = 20\sin(10^8 t - \beta z)\overline{ay}\ v/m. \text{find}\ \beta \text{and}\ \overline{H}.$$

   (b) Derive the expression for the reflection and transmission coefficients in case of reflection from perfect dielectric at oblique incidence. 10

5. (a) Explain in detail MOM method also state advantage and drawback of it. 10
   (b) State and derive the poynting theorem and describe the significance of each term 10

6. Attempt **any two** :
   (a) What is line of sight propagation? Obtain the expression for range of line of sight for space wave propagation in terms of antenna's transmitting and receiving heights. 10
   (b) Explain ground wave ,space wave propagations. 10
   (c) Derive an expression for radiation resistance of an small loop antenna. Explain Its significance 10