L 14/12/11 TE ETRX Sem-V CBSGS Continuous Time Signals & System

Con. 6547-11. (REVISED COURSE) MP–3828

(3 Hours) [ Total Marks : 100

**N.B. (1) Question No.1 is compulsory,**

**(2) Attempt any four questions out of remaining six questions.**

**(3) Assume suitable data wherever required but justify the same.**

1. Solve any four:- [20]
   (a) State the conditions which are required to be satisfied by function *f(t)* for Fourier series to exist.
   (b) Define ESD and PSD. What is the relation of ESD and PSD with autocorrelation?
   (c) Calculate average power of the given signal

   $$x(t) = 3\cos(5w_0 t)$$

   (d)What is the PDF of Uniform, Exponential and Gaussian distribution?

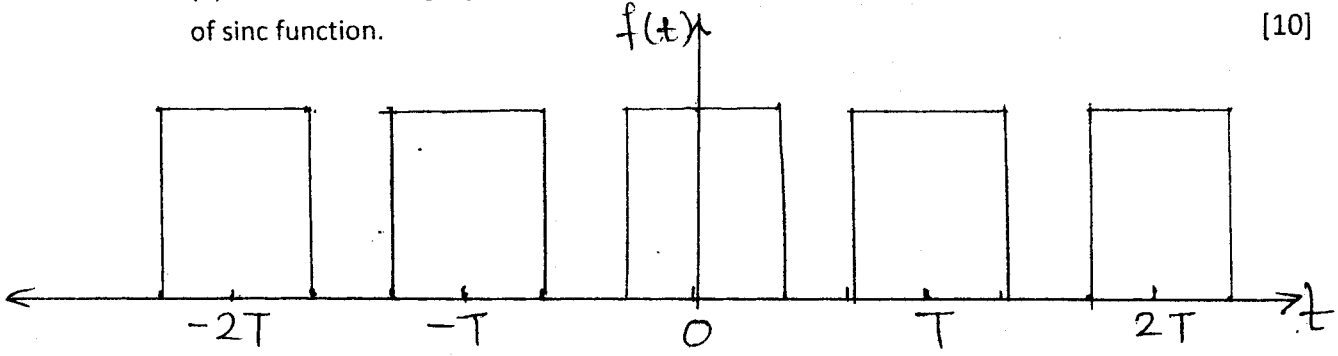
   (e) Classify the following system on the basis of stability and causality,

   $$y''(t) - 2t.y'(t) = x(t)$$

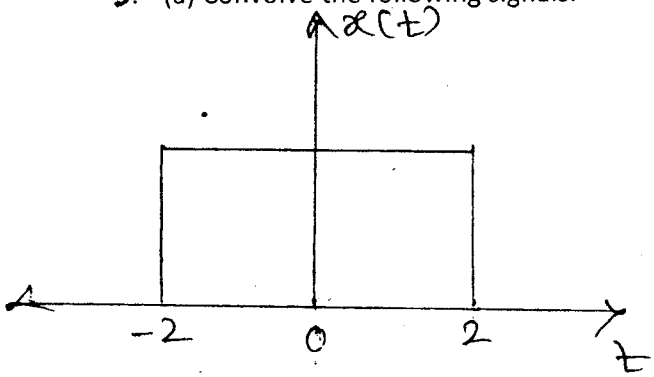
2. (a)Derive the relation between Fourier Transform and Laplace Transform. Find the inverse Laplace Transform of the following signal, [10]

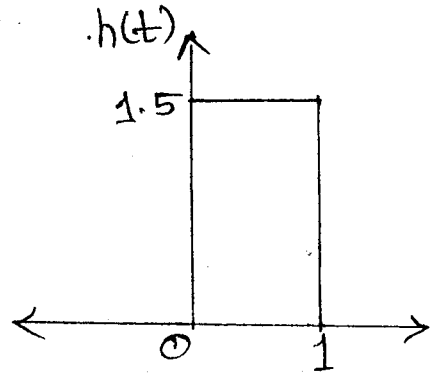
   $X(S) = 2s + 4 / s^2+4s+3$ for all possible ROCs.

   (b) For the following signal, Show that the Fourier transform of periodic Gate function is a form of sinc function. [10]




3. (a) Convolve the following signals: [10]




(b) Sketch x(t) if [10]

$$x(t) = 2u(t) + u(t-2) - u(t-4) + r(t-6) - r(t-8)$$

Hence obtain $x(2t+2)$

[ TURN OVER

4. (a) The differential equation of the system is given as follows:

$$y''(t) = 4y'(t) - y(t) + 4x'(t) + 2x(t)$$ [10]

Determine impulse response and state variable model of the system.

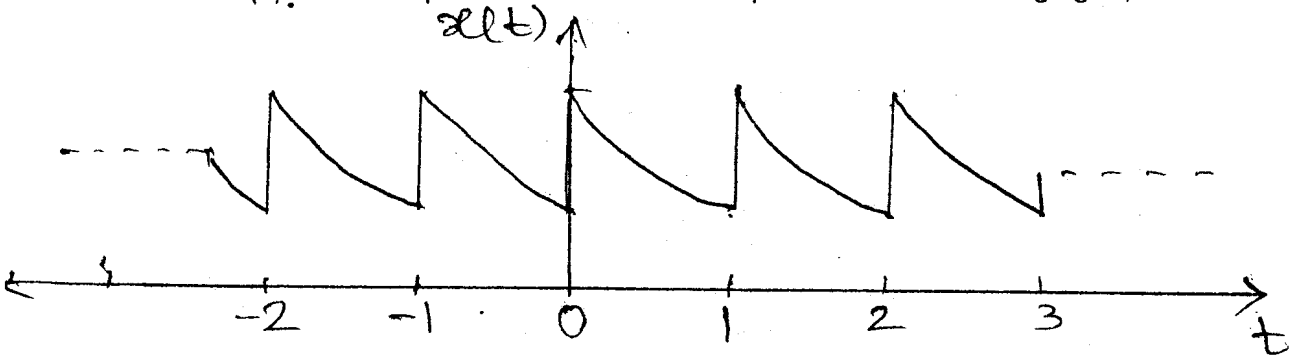
(b) State initial and Final value theorem of Laplace transform. Also find initial and final value

$$X(s) = \frac{2(s2+1)}{s(s+2)(s+5)}$$ [10]

5. (a) Find the autocorrelation , PSD, and power of the following signal; [10]

$$X(t) = 6\text{Sin}2t$$

(b) Find the exponential Fourier series expansion of the following signal, [10]



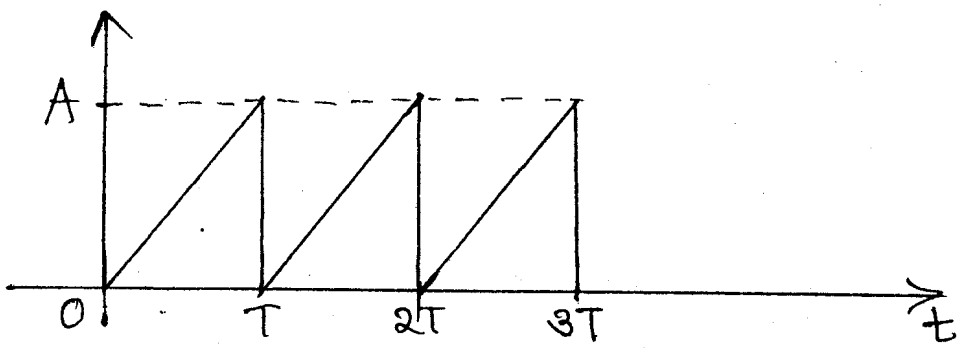

6. (a) State variable model of the system is given as follows, [12]

$$\begin{bmatrix} x1^{\bullet}(t) \\ x2^{\bullet}(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x1(t) \\ x2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} \cdot r(t)$$

$$\begin{bmatrix} y1(t) \\ y2(t) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x1(t) \\ x2(t) \end{bmatrix} \quad \text{and} \quad x(0)^T = \begin{bmatrix} 1 & 1 \end{bmatrix}$$

Determine response of the system to unit step input.

(b) Find the Laplace transform of [8]




7. Write short notes on the following: [20]
   (a) Rayleigh's energy theorem
   (b) State transition matrix
   (c) Energy signals Vs Power signals
   (d) Random processes

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9/12/2011 TE ETRX Sem-V MPMC-I

Con. 6364-11. (REVISED COURSE) MP–3835

(3 Hours) [ Total Marks : 100

N.B.:

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any four questions.
3. In all five questions to be attempted.
4. All questions carry equal marks.
5. Answer to each new question to be started on a fresh page.
6. Figures in brackets on the right hand side indicate full marks.

Q1. A) Explain register architecture of ARM processor (5)

B) Write a program in 8085 to convert a 8 bit binary number stored at 1000H into equivalent gray number. Store the gray number at the same location. (5)

C) Explain hardware connection for accessing external code memory using 8051 (5)

D) Explain following assembler directives of ASM51
1. DBIT 2. DS 3. Extrn 4. Public 5. ORG (5)

Q2. A) Interface 8155 with 8085 in simple I/O mode. Generate triangular waveform using DAC 0808. The output volatage should swing between 0-5V (10)

B) Explain interrupt structure of 8085 and interrupt related instructions. (6+4)

Q3. A) Write a program in 8085 to generate a square wave of 100 Hz frequency on the SOD pin. Assume 1 MHz operating frequency (10)

B) Explain block diagram of 8155 with control word format and data transfer between 8085 and 8155 in handshaking mode (10)

Q4. A) Explain block diagram of 8255 with BSR and I/O modes to interface it with 8085 (10)

B) Explain timing diagram of Memory read/write and I/O read/write cycles of 8085 (10)

Q5. A) Explain how 8051 interrupt structure allows single step execution also explain implementation of single step operation (10)

B) Explain following pins and instructions of 8051
1.EA 2. PSEN 3. SWAP 4. DAA 5. SUBB (10)

Q6. A) Explain addressing modes of 8051 with examples (10)

B) Explain different Timer modes of operations for 8051 (10)

Q7. A) Explain generation of control signals for 8085 microprocessor (05)

B) Explain the flag register (PSW) of 8051 (05)

C) Design 8031 based an intrusion warning system using interrupts that sounds a 400 Hz tone for 1 second (using a loudspeaker connected to P1.7) whenever a door sensor connected to (INT0 bar) makes a high to low transition. (10)

29/11/11 TE ETRX Sem-V Electromegnatic Engg.

ws Sept-2011-130

**Con. 5979–11.** **MP–3832**

(3 Hours) **[ Total Marks : 100**

**N. B. :** (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** from remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. (a) A uniform sheet charge with $\rho_s = \left(\frac{1}{3\pi}\right) n\,C/m^2$ is located at z = 5 m and a uniform line charge with $\rho_l = \left(-\frac{25}{9}\right) n\,C/m$ at z = –3 m, y = 3 m. Find E at (x, –1, 0) m. **5**

   (b) Given $H = H_m e^{j(wt + \beta z)} a_x$ in free space find E. **5**

   (c) What is impedence matching in transmission lines. **5**

   (d) Derive wave equations for time harmonic fields. **5**

2. (a) What was the inconsistancy in Ampere's Law; and how was it resolved in Maxwell equation ? Write Maxwell equation in integral and differential form. **10**

   (b) What is uniform plane wave ? Derive intrinsic impedence. A uniform plane wave at frequency of 300 MHz travels in vacuum along +y direction. The electric field of the wave at some instant is given by $E = 3\bar{x} + 5\bar{z}$. Find the phase constant of the wave and also the vector magnetic field. **10**

3. (a) What is polarisation of electro magnetic wave ? Explain Linear, Circular and Elliptical polarization in detail. **10**

   (b) Explain reflection and refraction of waves at dielectric interface. **10**

4. (a) A transmission line has primary constants R = 0·1/Ω/m, G = 0·01 ℧/m L = 0·01 μH/m, C = 100 pF/m. Find characteristic impedence. In this transmission line there are two waves travelling in opposite directions. At x = 0 and t = 0 the phase of the forward wave is zero and its amplitude is 2 V, where as the phase of backward wave is $\pi/3$ and its amplitude is 0·5 V. **10**

   (i) What is the instantaneous current and voltage at x = 50 cm and t = 1 n sec ?

   (ii) What is the peak voltage and current at x = 1 m.

   (b) Show that a linear polarization can be generated by two circularly polarized waves. Explain how a linearly polarized wave with tilt angle of $\pi/3$ can be generated by two circularly polarized waves. **10**

**[ TURN OVER**

5. (a) Explain power flow due to time varying fields. Derive Poynting vector. 10
   (b) Explain impedence matching in detail. 10

6. (a) A plain wave travelling in the +z direction in free space ($z < 0$) is normally incident at $z = 0$ on a conductor ($z > 0$) for which $\sigma = 61{\cdot}7$ Ms/m, $\mu r = 1$. The free space E wave has a frequency $f = 1{\cdot}5$ MHz and an amplitude of 1·0 V/m. At the interface it is given by 10

$$E = (0, t) = 1{\cdot}0 \sin 2 ft \text{ by } \bar{a}y \text{ V/m.}$$

   find H(z, t) for $z > 0$.

   (b) A high frequency 50 Ω loss less line is 141·6 cm long with a relative dielectric constant $\epsilon_r = 2{\cdot}49$ at 500 MHz the input impedence of the terminated line is measured as $Z_{in} = (20 + j\ 25)_{\Omega}$. Use Smith chart to find the value of terminating load. 10

   After the impedence measurement an 8 pF lossless capacitor is connected in parallel with the line at a distance of 8·5 cm from the load. Find the VSWR on the main line.

7. (a) Explain Electromagnetic interference and its effects. 10
   (b) In a medium characterised by 10

$$\sigma = 0,\ \mu = \mu_0 \text{ and } \epsilon_0$$

$$E = 20 \sin \left(10^8 t - \beta z\right) \bar{a}y \ \frac{V}{m}$$

   Find β and H.

3/12/11 TE ETRX Sem-V LICD.

44 : 2nd half.11-AM(d)

**Con. 6158-11.** **MP-3826**

(3 Hours) **[ Total Marks : 100**

**N.B. :** (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of **remaining** questions.
(3) Assume suitable **data** if **necessary**.
(4) Illustrate answers with neat **sketches** wherever **required**.
(5) **Figures** to the **right** indicate **full** marks.

1. Attempt any **four** of the following :— **20**
   (a) Compare the transconductance and transresistance amplifier circuit.
   (b) Explain the important characteristics and limitations of comparator circuits using Op-Amp.
   (c) Design a current source using IC 7805 that will deliver a 0·25 A current to the 48 Ω, 10 w load.
   (d) Explain the operation of Schmitt trigger using timer IC.
   (e) Why is an inverted R-2R ladder network DAC better than R-2R ladder DAC.

2. (a) Derive an expression for voltage shunt feedback amplifier using LM 741. **10**
   If the same circuit is driven by a ± 10V peak to peak triangular wave. If input resistor $R_1$ = 10 KΩ, feedback resistor $R_f$ = 20 KΩ and supply voltages = ± 15V sketch the precise waveforms at (i) input (ii) output (iii) at inverting i/p.
   (b) Draw the block diagram of Instrumentation amplifier. Design digitally programable IA having an overall gain of 1V/V, 10V/V and 100V/V. **10**
   Also state its applications.

3. (a) What is S. R. What are causes of S. R. **10**
      (i) If an Op-Amp has SR of 2 V/μsec. What is the max. frequency of an output sinusoid of 5 V peak value at which distortion sets in due to the S. R. limitation ?
      (ii) If the sinusoid of 10 V peak is specified what is the full power B. W.
   (b) Derive an expression for basic integrator circuit. If $R_1C_F$ = 1 sec and input is 2 V dc then draw the output voltage wave form by considering an Op-Amp is initially nulled. What is the necessity of lossy integrator circuit ? **10**

4. (a) Design unity gain KRC low pass filter with $f_0$ = 10 KHz and Q = 2. **10**
   (b) Compare inverting mode and non-inverting mode state variable filters. **10**

5. (a) Draw and explain the astable multivibrator circuit using functional block dig. of SE555. And design the same for a frequency of 1 KHz and duty cycle of 70% using Pin dig. use c = 0·1 μF **10**
   (b) Explain the operation of Weinbridge oscillator circuit using Op-Amp. Derive an expression for its output frequency. **10**

6. (a) State the important features and applications of LM 723. **10**
   (b) State the important specifications of ADC. Explain the logic diagram of dual slope ADC in detail. **10**

7. Write short notes on the following :— 20

(a) Monolithic PLL

(b) Regenerative Comparator

(c) Precision rectifiers

(d) Sample and Hold amplifier.

L19/12/2011 TE (ETRX) Sem-II CBSGS DCCT 19/12/2011

**Con. 6709-11.** **MP-3838**

(3 Hours) **[Total Marks : 100**

**N.B. :** (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of **remaining.**
(3) Assume **suitable** data wherever **required** and **justify** it.

1. (a) Define error control coding. Explain the code rate, code efficiency and Hamming distance. **20**
(b) Write a note on PN sequence generator.
(c) Explain phase continuity is maintained in MSK signal.
(d) Define Entropy and redundancy.

2. (a) A three digit message is transmitted over a noisy channel having a probability of error **5**
$p(\epsilon) = \frac{2}{5}$ per digit, find out the corresponding PDF and CDF.
(b) State and explain Shanon Heartly theorem. Also explain bandwidth–S/N trade-off. **7**
(c) For binary sequence 01001111 draw waveform for :— **8**
(i) NRZ (bipolar) (ii) BPSK (iii) QPSK.

3. (a) Explain ISI and CSI. What causes them ? Explain how they can be overcome. Also explain eye-digram. **10**
(b) Differentiate between :— **10**
(i) QASK and QPSK
(ii) BPSK and BFSK
(iii) Coherent and non-coherent detection.

4. (a) The generator polynomial of (7, 4) cyclic code is $X^3 + X + 1$. **10**
(i) Sketch an encoder for same.
(ii) Construct the generator Matrix for systematic cyclic code and find the codeward used for message { 1 1 0 1 (LSB) } using the generator Matrix.
(iii) Verify the result using division method.
(b) What is duo-binary encoding ? Explain with neat diagram. How the duo-binary encoding reduces the bandwidth requirement ? **10**

5. (a) Derive an expression for error probability of Matched filter. **10**
(b) Explain with neat diagram, direct sequence spread Spectrum Technique. What is the processing gain and Jamming Margin ? **10**

6. (a) Explain the Nyquist criteria for distortionless baseband transmission. **10**
(b) Draw block diagram of generator of DPSK and also explain how data is recovered from DPSK signal. **10**

7. Write a short note on any **four** :— **20**
(a) Centeral limit theorem
(b) Viterbi algorithm
(c) Offset and non-offset QPSK
(d) Line code
(e) Compare MPSK and MFSK.