22/11/2012

TE/ETRX/V (Rev)
EME

ws Sept. 2012 (b) 13

Con. 7582–12. KR–4958

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from Question Nos. **2** to **7**.
(3) Vector notation should be used wherever **necessary**.
(4) Assumptions made should be clearly **stated**.

1. (a) Explain lossless propagation. **5**
   (b) State and explain Poynting theorem. **5**
   (c) Derive wave equation for homogeneous unbounded source free medium starting from Maxwell's equation. **5**
   (d) Write a note on Smith Chart. **5**

2. (a) Obtain the transmission line equations for a two wire transmission line. Define characteristic impedance of the transmission line. Derive an expression for its characteristic impedance. **10**
   (b) Using Smith Chart find the input impedance and reflection coefficient at a point 0·64 λ from load $Z_L = (75 - j\ 25)\ \Omega$ characteristic impedance is 50 Ω. **10**

3. (a) Explain various types of electromagnetic interferences. **10**
   (b) Derive Maxwell's equation in integral form. **10**

4. (a) State and prove the Poynting theorem. Explain the integrals involved in the statement. **10**
   (b) Explain reflection of uniform plane wave at normal incidance. **10**

5. (a) What is need of Electromagnetic Compability ? **6**
   (b) Explain Divergence theorem. **4**
   (c) Explain potential functions for sinusoidal radiation oscillations. **10**

6. (a) Derive the expressions for the reflection and transmission coefficients in case of reflection from perfect dielectric at – **10**
      (i) Normal incidence
      (ii) Oblique incidence (parallel polarization).
   (b) A lossless 50 Ω transmission line is terminated in 25 + j 50 Ω. Find – **10**
      (i) Voltage reflection coefficient
      (ii) Current reflection coefficient
      (iii) VSWR
      (iv) Impedance at 0·3 λ distance from the load.

7. Write short notes on :– **20**
   (a) Helmoltz Equations
   (b) Gauss's Law
   (c) Poisson's Equation
   (d) Impedance Matching.

TE / ETRX / IV (R) 27/11/12
LICD

Shilpa -(b) 38

Con.7605-12. **KR- 5084**

(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 if **required** and state it **clearly**.
(4) **Figures** to the **right** indicate **full** marks.

1. Answer the following questions :–
   (a) Derive an expression for summing amplifier and averaging amplifier output voltage assuming three input voltages. **5**
   (b) What is KRC filters ? Why are KRC filters operated for Q < 10 ? **5**
   (c) Explain with neat block diagram counter type Analog to Digital converter. **5**
   (d) Design a 0.5 A current source using IC 7805. Assume $R_L = 10\ \Omega$. **5**

2. (a) Explain with neat circuit diagram the working of Half wave Precision Rectifier. **5**
   (b) Draw the circuit diagram of second order High pass KRC filter. Calculate the cutoff frequency (Fo) and K, if $R_1 = 27\ K\Omega$, $R_f = 16\ K\Omega$, $R_2 = R_3 = 27\ K\Omega$, $C_2 = C_3 = 0.005\ \mu F$. **5**
   (c) Explain in detail with the neat circuit diagram the Wien Bridge oscillator. **10**

3. (a) Draw and explain the functional diagram of Timer IC 555 and explain its operation in astable mode. **10**
   (b) Draw and explain the circuit diagram to generate square and triangular waveforms using OP-AMPS. Derive the expression for frequency and comment about the range of frequency. **10**

4. (a) Draw and explain the functional diagram of voltage regulator IC 723. State its features and applications. **10**
   (b) Design a voltages regulator using IC 723 for $V_0 = 5V$, $I_0 = 50\ mA$, $Isc = 75\ mA$, $V_{in} = 15V$. Assume $V_{sense} = 0.6V$. **10**

5. (a) Explain in detail about switched capacitor filters. **10**
   (b) Derive the expression of output voltage for difference amplifier with neat circuit diagram. Design the same for $V_0 = V_2 - 3V_1$ and $Ri_1 = Ri_2 = 100\ K\ \Omega$. **10**

6. (a) What is Phase Locked Loop ? Explain about monolithic PLL. **10**
   (b) With the help of OP-AMP model explain the Slew Rate limitation ? Also explain various methods of increasing slew rate. **10**

7. Write short notes on (any **four**) :– **20**
   (a) R – 2R Ladder DAC
   (b) Differentiator
   (c) I to V converter
   (d) Peak detector
   (e) Dual slope intergrator ADC.

8/12/12

T.E. ETRX Sem V (Rev) N/D-2012

Sub:- MPMC-I

Con. 7620-12. **KR–5225**

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

N.B.: (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of the **remaining**.

1. (a) Explain internal RAM memory organization of 8051 microcontroller. **5**
   (b) Explain CPSR register of ARM7 processor. **5**
   (c) Write a program for 8085 processor to convert two digit packed BCD number into unpacked BCD. **5**
   (d) Explain the $\overline{SP}/\overline{EN}$ pin of 8259 interrupt controller. **5**

2. (a) Design and explain two wait state generator circuitary which inserts two wait states in every OPCODE FETCH machine cycle. **10**
   (b) Differentiate between I/O mapped I/O and memory mapped I/O. **10**

3. (a) Design 8085 based system with following specifications : **12**
      (i) CPU operating at 3 MHz
      (ii) 16 KB program memory using 4 KB devices.
      (iii) 4 KB data memory using 2 KB devices.
      (iv) One 8 bit input port and one 8 bit output port performing interrupt driven I/O and interfaced in I/O mapped I/O mode.

   Use exhaustive decoding approach. Give detailed I/O map and memory map and neat interfacing diagram.
   (b) Write 8085 based program to arrange ten data bytes in ascending order. Assume the data array begins from memory address 1000_H onwards. **8**

4. (a) Explain Interruprt Enable and Interrupt Priority registers of 8051 microcontroller. **10**
   (b) Explain Interrupt structure of 8085 processor. **10**

5. (a) Interface 0808 ADC to 8051 microcontroller and write a program to take in analog input connected to input channel 0 and send the converted digital data on LED's connected to PO. **12**
   (b) Explain Timer O internal structure in detail. **8**

6. (a) Write 8051 based program to generate a delay of 100 m sec if controller operates at 12 MHz crystal frequency. Show the delay calculations. **10**
   (b) Explain MODE 0 and MODE 1 of 8253 Timer/Counter peripheral IC with the help of timing diagram. **10**

7. (a) Explain the instructions given below :— **10**
      (i) ADDS r_0, r_2, r_3
      (ii) ADD r_0, r_0, r_0, LSL-# 1
      (iii) TST r_0, r_3
      (iv) MVN r0, r_2
      (v) ORR r_3, r_2, # 1 < < 16
   (b) Explain input data transfer using bandshake signals of 8255 with the help of timing diagram. **10**

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605/609 CTSS

ws Sept, 2012 (b) 23

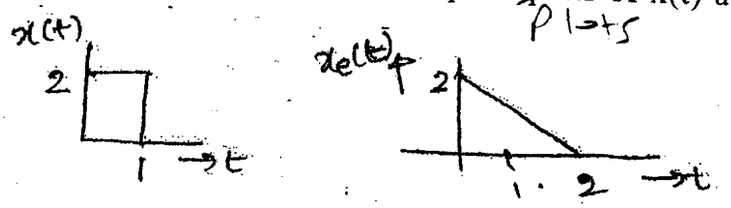
Con. 7626–12.

KR–5339

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

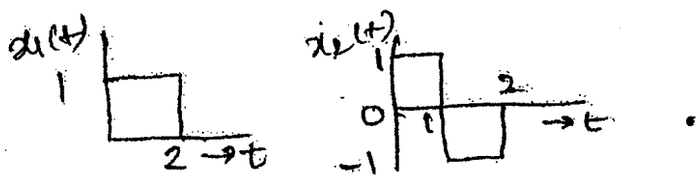
N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions from the remaining.
(3) Assume **suitable** data if **required**.

1. (a) Derive relation between unit impulse, unit step and unit ramp signals.
   (b) **Figure** below shows some part of signal x(t) and its even part for $t \geq 0$. The even part for $t < 0$ is not shown. Complete ~~plats~~ plots of x(t) and $x_e(t)$ **20**

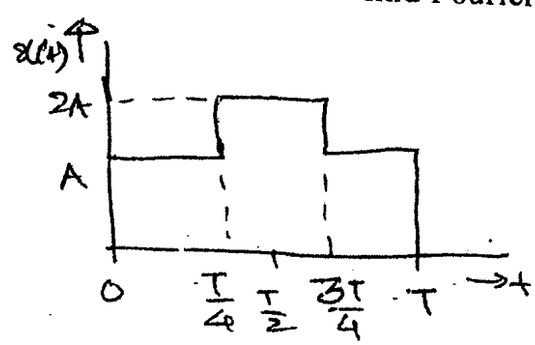


   (c) Give equations and sketch PDF of exponential and Gaussian distribution.
   (d) Evaluate $-\int_{-2}^{4} (2+t^2)\,\delta(t-1)\,dt + \int_{-1}^{1} t^2\,\delta(t+4)\,dt$

2. (a) Convolve the following signals in time domains. Do not use transform. Sketch the convolved result. **10**



   (b) Using properties of Fourier transform find Fourier transform of signal shown. **10**



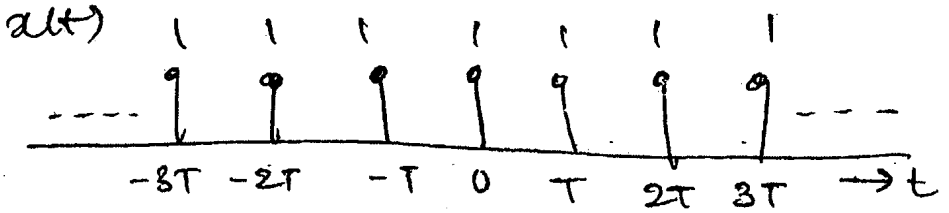
3. (a) Obtain transfer function for a system having state equation. **10**

$$\begin{bmatrix} \dot{x}_1 & (t) \\ \dot{x}_2 & (t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \longrightarrow ?$$

   (b) The input $x(t) = e^{-2t}\,u(t)$ is given to system. The output response of system to input is $y(t) = e^{-t}\,u(t)$. Find impulse response and frequency response of sytsem. **10**

[TURN OVER

4. (a) If $u(t) \leftrightarrow X(s)$, determine time domain signal that corresponds to following transform domain signals. Use properties only and clearly state them :– **10**
   (i) $SX(s) - 1$ (ii) $X(2s)$ (iii) $X(s+1)$ (iv) $s^{-1} X(s)$
   (b) Find Fourier transform of impulse train shown : **10**



5. (a) State conditions which are required to be satisfied by x(t) for Fourier series to exist. **5**
   (b) Define ESD and PSD. What is relation of ESD and PSD with autocorrelation ? **5**
   (c) Sketch $x(t) = 2u(t) + u(t-2) - u(t-4) + r(t-6) - r(t-8)$ **5**
   Hence obtain $x(2t + 2)$
   (d) Obtain Canonical form of system $\dot{x} = Ax(t) + Bu(t)$ **5**

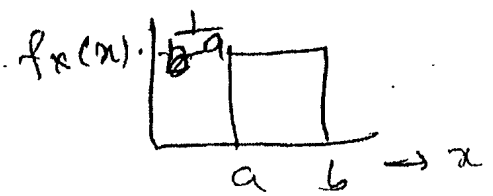
$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 3 \\ 0 & 1 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

6. (a) State and prove convolution property of Fourier transform. **5**
   (b) Derive relation between Laplace transform and Fourier transform. Determine Inverse Laplace transform for all possible ROC's of X(s) **10**

$$X(s) = \frac{s^2 + 2s + 5}{(s+3)(s+5)^2}$$

   (c) Impulse response of a system is $G(t) = -3\, e^{+2t}\, u(t)$. **5**
   Find whether system is Causal/Non causal and Stable/Unstable

7. (a) Show single and double sided representation of signal $x(t) = \sin\left[20\pi t - \pi/4\right]$. **5**
   (b) Find CDF of random variable given below :– **5**



Plot it

   (c) Explain Rayleigh's energy theorem. **5**
   (d) Write short note on Random process. **5**

KR-5339

Q. 3 a) Obtain transfer function for a system having state equation

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

and $$y(t) = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}$$

ETRX Sem V 13 Dec '12

DCCT

P4–RT–Exam.–Oct.–12–2–5

Con. 10674–12. **KR–5486**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** of the **remaining** questions.
(3) Draw **diagram** wherever **necessary**.
(4) Assume **suitable** data, if **necessary**.

1. (a) Differentiate between – **10**
(i) QASK and QPSK (ii) Systematic and Non Systematic Codes

(b) What is duo Binary encoding ? Explain with neat diagram. How does duobinary encoding reduce BW requirement. **10**

2. (a) A DMS has five symbols with probabilities 0. 2, 0.2, 0.1, 0.35 and 0.15 respectively. Construct Huffmann code and calculate code efficiency. Repeat for Shannon Fano code. **10**

(b) Explain with neat block diagram the principle of working of non-coherent FSK receiver. **10**

3. (a) Derive expression for SNR of a Integrate and dump filter. **10**

(b) Given Parity check matrix for (7,4) Hamming code – **10**

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

correction

Calculate syndrome vector for single errors. Draw block diagram of encoder and syndrome decoder and explain.

4. (a) With a neat block diagram explain DSSS technique. What is processing gain and jamming margin. **10**

(b) The generator polynomial for a (7, 4) cyclic code is $G(D) = 1 + D + D^3$. Compute systematic and non-systematic code for data I/P 1010. Find generator matrix. **10**

5. (a) For a $\frac{1}{2}$ rate, K = 3 convolutional code, the impulse response is given as **10**

$g_1 = [1, 1, 1]$ and $g_2 = [1\ 0\ 1]$
Draw block diagam of encoder and obtain encoded output for data 1110110. Also sketch code tree and trace path corresponding to above message data.

(b) Why is MSK called shaped QPSK ? Justify with relevant expressions or waveforms. **10**

6. (a) Describe briefly tapped delay line equalizes. **10**

(b) What is ISI ? Derive expression for ISI and explain methods to overcome ISI. **10**

7. (a) Draw block diagram of BPSK Transmitter and receiver and explain. Sketch signal space diagram and PSD of BPSK. **10**

(b) Write note on :– **10**
(i) Viterbi Algorithm (ii) M-ary PSK.