Sem-V - ETRX (CBSGS)

Dt: 5/6/17

06

O.P. Code : 18258

Time: 3 Hrs. **Total Marks:80**

NOTE
1) Question number 1 is compulsory.
2) Attempt any three questions from the remaining five questions.
3) Assume suitable data wherever necessary.

Q1 a How will you map any point on s-plane to z-plane? 5

b State and prove Duality property of Fourier Transform. 5

c How will you obtain z-transform of the discrete time signal x(nT), from Laplace transform of sampled version of x (t), using $z=e^{sT}$ 5

d Find the transfer function of a system having its unit step response given as: $s(t) = t\,u(t) + \sin(t)\,u(t)$ 5

Q2 a Verify periodicity of the following continuous time signals. If periodic find the fundamental period. 4

(i) $x(t) = 2\cos(t/4)$

(ii) $x(t) = e^{-j2\pi t/7}$

b Determine power or energy of the following continuous time signal: 4

(i) $x(t) = 3\cos(5\pi t)$

(ii) $x(t) = e^{j(2t+\pi/4)}$

c Determine whether the following systems are linear/nonlinear, time variant/invariant, causal/noncausal, and stable/unstable. 12

(i) $y(t) = e^{t}\cdot x(t)$

(ii) $y(t) = \cos t\cdot x(t)$

Q3 a State the sampling theorem. Discuss the effects of aliasing in frequency spectrum. 10

b Determine the impulse response sequence of the discrete time LTI system defined by

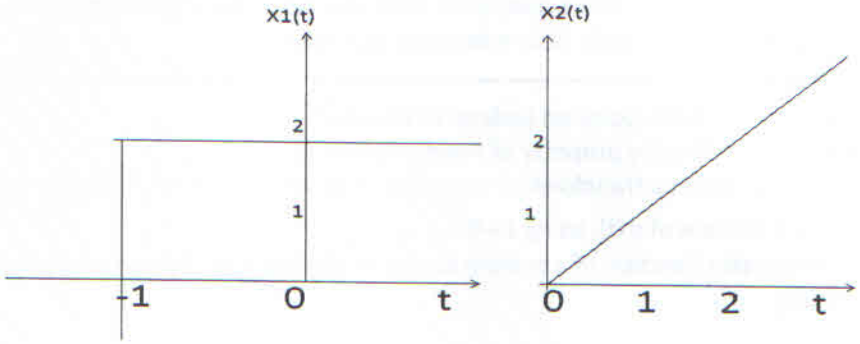
$y(n) - 2y(n-1) + y(n-2) = x(n) + 3x(n-3)$

Q4 a Determine the natural response of the system described by the equation : 10

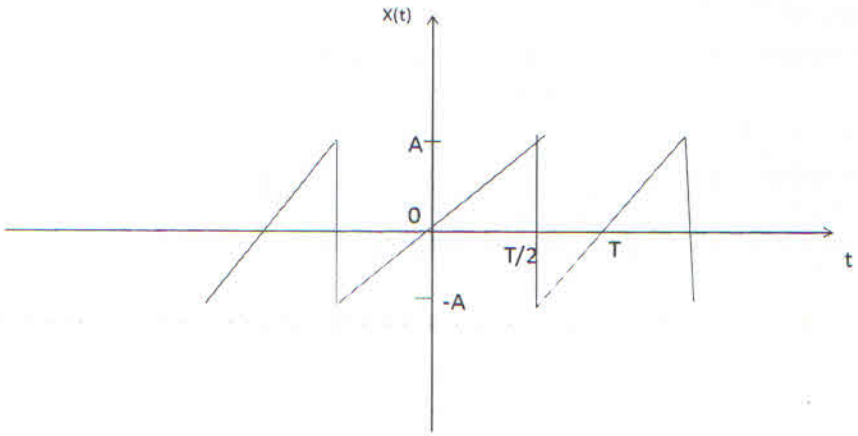
$$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 5y(t) = \frac{dx(t)}{dt} + 4x(t)\;;\quad y(0) = 1\;;\frac{dy(t)}{dt} = -2 \text{ at } t = 0$$

TURN OVER

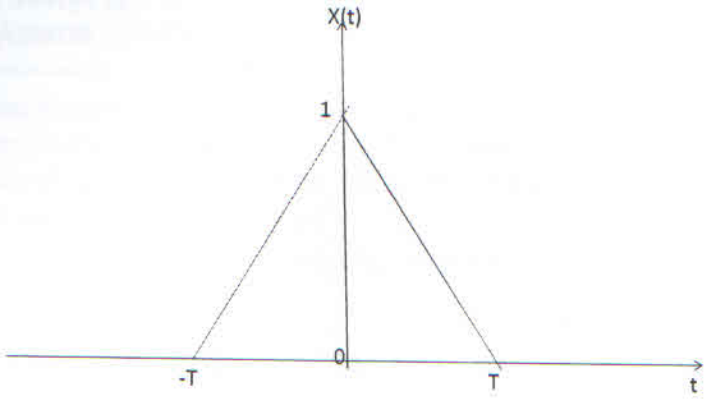
Q4 b Perform convolution of the following signals, by graphical method and sketch the resultant signal. 10



Q5 a Determine the trigonometric form of Fourier series for the signal shown in figure:- 10



b Determine the Fourier transform of the triangular pulse shown in figure:- 10



Q6 a Obtain inverse Laplace transform of $X(s)=\frac{4}{(s+1)(s+2)^2}$ for all possible ROC conditions. 10

b Determine the Z transform and sketch ROC 10

1) $X_1[n]=[\frac{1}{3}]^n ;n\geq 0$

2) $X_2[n]=X_1[n+4]$

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(64)

Q. P. Code: 13634

Duration:3 hours **Total marks:80**

N.S.: (1) Question No.1 is compulsory.
(2) Solve any four from remaining six questions.
(3) Figures to the right indicate full marks

1. Answer the following questions: (20)

(a) Why and how the bandwidth of a signal is spread using spread spectrum.

(b) Define entropy of an information source and explain its significance.

(c) Compare and contrast digital communication with analog communication

(d) Explain the salient features of BFSK.

(e) Discuss on linearity and cyclic property of linear codes.

2(a) Develop MSK waveform (with all intermediate waveforms) for 11000111 for m=5 & n=1 on the graph paper and justify the term "minimum shift keying". (10)

(b) A (7,4) cyclic code is generated using the polynomial $x^3 + x + 1$

i) Generate the systematic cyclic code for the data 1100.

ii) Draw the encoder & show how parity bits are generated for the data 1100. (10)

3(a) Compare BPSK and QPSK based on following parameters:- bandwidth requirement, noise immunity, transmission rate, efficiency & applications. (10)

(b) The generator matrix [G] of linear (7,4) block code is as follows:

$$G = \begin{matrix} 1111000 \\ 1010100 \\ 0110010 \\ 1100001 \end{matrix}$$

i) Find parity check matrix

ii) Determine the syndrome for the code word 1101101.State with reasons whether this a valid code word (10)

4(a) A three digit message is transmitted over a noisy channel having a probability of error P(e) = (1 / 5) per digit.

a. Determine Probability of occurrence of errorless message

b. Determine Probability of message having error in any two digits

Turn Over

c. Determine Probability of message having error in all digits

d. Plot the all possible probabilities of occurrence of error (10)

(b) Distinguish between direct sequence spread spectrum (DSSS) and frequency–hop spread spectrum (FHSS) with respect to principle and applications. (10)

5(a) Derive the probability of error of matched filter. Comment on your results. (10)

(b) Consider an alphabet of a discrete memory less source having five different symbols with probabilities as shown below:

Symbol	S1	S2	S3	S4	S5
Probability	0.1	0.2	0.4	0.1	0.2

Construct: (a) Huffman Code for each symbol.

(b) Determine average codeword length of the above source.

(c) Comment on your results. (10)

6(a) What is an eye diagram, explain the parameters observed from it with an illustration. (10)

(b) State Nyquist's Criterion for distortion less transmission. State its significance with duo-binary encoding. (10)

T.E. Sem-V. ETRX 23.5.17
CBGS.

Q.P. Code :13161

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

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

Q.1 a) Compare integrator & differentiator. 05
b) Define input offset voltage, output offset voltage, input bias current & input offset current for op-amp. 05
c) Explain any five specifications of the digital to analog converter (DAC). 05
d) Describe the basic block diagram of the phase locked Loop (PLL). 05

Q.2 a) Derive the expression of inverting & the non-inverting amplifier using op-amp (Av) & design them both for |AV|=10 10
b) Derive the output voltage (V_o) expression of op-amp three input averaging circuit. 10

Q.3 a) Design 2nd order KRC Low pass filter (LPF) for cut-off frequency fo=10 kHz with quality factor (Q) of 5. 10
b) Design 1st order high pass filter for a cut-off frequency fo=2 kHz with unity gain. How will you modify the design to achieve low pass filter (LPF) operation? 10

Q.4 a) Describe the parallel comparator/ flash type analog to digital convertor (ADC) with a neat diagram. 10
b) Explain the operation of inverting Schmitt Trigger with neat diagram, input & output waveforms with transfer characteristics. 10

Q.5 a) Design Monostable multivibrator using IC 555 to generate a time delay of T=500 ms. Assume + V_{cc}=10V. 10
b) Design a positive voltage regulator to generate Vo=+5V with Io = 50mA by using IC LM 723. Draw neat diagram of the designed circuit. 10

Q.6 Write short notes on **(any four):-**
a) 3 stage R-C phase shift oscillator using op-amp.
b) Triangular waveform generator using op-amp.
c) Precision Rectifier using op-amp.
d) Log-Antilog amplifier using op-amp.
e) Voltage controlled oscillator (VCO)

TE - Sem-V ETRX 17/5/17

Electromagnetic Engineering

Q. P. Code : 13678

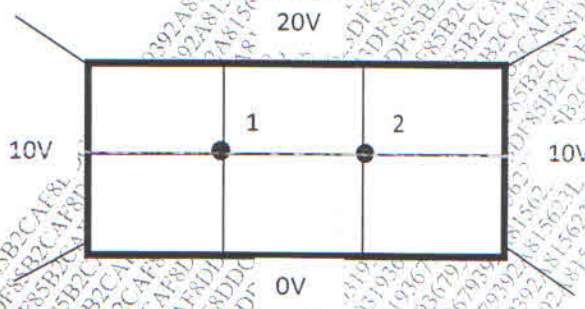
(3 Hours) [Total Marks : 80

N.B. : (1) Question no.1 is compulsory
(2) Solve any three questions from Question no 2 to Question no 6
(3) Assume suitable data if necessary
(4) Figures on the right indicate the marks

1. Attempt any four:
   a) Derive Laplace's and Poisson's equations. 5
   b) Starting with Maxwell's equations derive the wave equation for a wave propagating in free space. 5
   c) Define and explain radiation intensity, directive gain, beam width and directivity of an antenna. 5
   d) Define critical frequency, MUF and OWF. A high frequency radio link has to be established between two points on the earth 3000km away. If the reflection region of the ionosphere is at a height of 200km and has a critical frequency of 10MHz, calculate the MUF of the given path. 5
   e) Explain the concept of retarded potentials. 5

2. a) Derive the boundary conditions for the electric and magnetic field at a dielectric-dielectric boundary. 10
   b) An infinite uniform line charge with a density of 20nC/m is located along the z-axis and a surface charge density of 0.1nC/m^2 exists on the plane z=3. Find **E** at P(1,2,5)m. 10

3. a) Use the Iterative finite difference method and the band matrix method to calculate the potentials at nodes 1 and 2 in the potential system shown in figure below. 10



   b) Define polarization of an electromagnetic wave. Explain linear, circular and elliptical polarization. 10

4. a) State Poynting theorem. Derive the Poynting vector and explain the power terms involved in the derivation. 10
   b) Find the transmission and reflection coefficients at a boundary for normal incidence. For region 1 $\varepsilon_{r1}=9$, $\mu_{r1}=1$ and $\sigma_1=0$. Region 2 is free space. Assume perpendicular polarization. 5
   c) An electric field in a medium which is source free is given by $\mathbf{E}=1.5\cos(10^8 t-\beta z)\mathbf{a}_x$ V/m. Obtain **D, B, H**. Assume free space medium. 5

5. a) Derive an expression for the radiation resistance of an infinitesimal dipole antenna and explain its significance. 10
   b) Explain the effect of imperfection of earth, curvature of earth, effect of interference zone and shadowing effect of hills and buildings on space wave propagation. 10

6. Write short notes on:
   a) Folded dipole antenna 7
   b) Skin depth 6
   c) Wave propagation in dispersive media 7

T.E. Sem-V ETRX (CBSGS) Dt: 29/5/17

Q. P. Code : 591302

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

N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining questions.
(3) All questions carry equal marks.

Q.1 (a) Explain the ARM7 pipeline and justify how hazards are reduced in the pipeline of the ARM7. **05**
(b) Explain the concept of register banks in 8051. **05**
(c) Explain the power saving modes of the 8051. **05**
(d) Explain the function of the barrel shifter in the ARM7 core. **05**

Q.2 (a) Write an assembly language program for interfacing an alphanumeric LCD to the 8051. Draw the interfacing diagram. **10**
(b) Explain the architecture of the ARM7 core with a neat diagram. **10**

Q.3 (a) Write an assembly language program to transfer a block of data in memory using load and store instructions ofthe ARM7. **10**

(b) Explain the structure of the Input /Output ports of the 8051 with neat diagrams. **10**

Q.4 (a) Explain the functions of the bits of the CPSR in the ARM7 and differentiate between the CPSR and the SPSR. **10**

(b) Interface 32K of RAM (using 16K devices) and 32K of ROM (using 16K devices) to the 8051. Show the memory map, clock circuitry and other necessary signals. **10**

Q.5 (a) Write a program (with and without timer) to generate a square wave on pin P1.2. Highlight the difference in the two methods. **10**

(b) "ARM-Thumb interworking improves the code density". Justify with a neat example. **10**

Q.6 (a) Write a detailed note on the Interrupt structure of the 8051 and explain the related SFRs. **10**

(b) Explain the following instructions: **20**
(i) MOVC A,@A+DPTR
(ii) DJNZ R2,Back
(iii) MLA R7,R8,R9,R3
(iv) BLE loop.

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