ETRX/Sem-V(CBSGS)/Microcontroller & / Nov-16.
Application

Q. P. Code : 591300

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

N.B. (1) Question **No.1** is compulsory.
(2) Solve **any three** questions from the remaining five questions.
(3) All questions carry equal marks.

Q.1 (a) Describe the SCON and SBUF - SFR's in 8051. **05**

(b) Explain the function of the barrel shifter in the ARM7 core. **05**

(c) Draw and explain the CPSR register of the ARM processor. **05**

(d) Explain the concept of register banks in 8051. **05**

Q.2 (a) Explain the structure of the Input/Output ports of the 8051 with neat diagram. **10**

(b) Explain in detail the operating modes of the ARM7. **10**

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

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

Q.4 (a) Write an assembly language program for interfacing 'YES' serially at 9600 band continuously using the 8051. **10**

(b) Explain the interfacing of 8051 to external memory with the help of suitable diagram. (Make necessary assumptions) **10**

Q.5 (a) "ARM-Thumb interworking improves the code density". Justify with a neat example. **10**

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

Q.6 Write short note on (**any three**). **20**
a) DC motor interfacing with 8051.
b) ARM7 Architecture.
c) Power saving modes of the 8051.
d) Thumb state of the ARM7.

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TE | Sem-V(CBSGS) | ETRX | Design with linear Integrated Circuits | Nov-16

Q.P. Code : 591200

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

N.B. : (1) Question **No.1** is **compulsory** and Solve **any three** from remaining questions.
(2) Assume suitable **data** if **necessary**.

1. Solve **any four** questions :
   (a) Explain the need of dual power supply in Op–amp. **5**
   (b) What is ideal integrator? How disadvantages of Basic integrator can be overcome? **5**
   (c) What is difference between normal rectifier & precision rectifier. Explain half wave precision rectifier. **5**
   (d) List important specifications of ADC 0808. **5**
   (e) Compare voltage regulator with IC 78XX with IC 723. **5**

2. (a) Give complete analysis of inverting amplifier Op–amp circuit. Hence design it for voltage gain = 10. **10**
   (b) Design RC phase shift oscillator for frequency equal to 10 kHz. **10**

3. (a) Design Schmitt trigger circuit to achieve UTP = 2V & LTP = –2V. **10**
   (b) Explain Dual slope ADC in detail with its advantages & disadvantages. **10**

4. (a) Explain PLL using block diagram of 565 PLL. **10**
   (b) Design voltage regulator for given specification using 78XX & 79XX IC's **10**
   $V_o = \pm 12V$, $I_L = 100$ mA.

5. (a) Give different filter classifications and hence explain Butterworth & Chebyshev Response. **10**
   (b) Explain triangular wave generator using Op–amp. **10**

6. Attempt **any four** questions : **20**
   (a) Level detector
   (b) Voltage to current converter
   (c) Monostable multivibrator using IC 555
   (d) Functional diagram of IC 723

TE / ETRX - V / CBSGS – Electromagnetic Engineering
NOV-16

QP Code : 591102

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

N.B. : (1) Questions no. **1** is compulsory.
(2) Solve **any three** from question no. **2** to question no. **6**
(3) **Right** figures **indicate** the marks.

1. Solve any **four**
   (a) Point charges $Q_2 = 300\ \mu C$ located at (2, -1, -3) m in experiences a force $\bar{F}_2 = 8a\bar{n} - 8a\bar{y} + 4a\bar{z}$ N due to point charge Q_1 at (3, -4,-2) m. Determine Q_1 **5**
   (b) The height of a monopole antenna is $\lambda/100$. what is radiation resistance of antenna. **5**
   (c) State and explain Biot-Savart law. **5**
   (d) Find out the divergence and curl of the following function **5**
   $\bar{F} = 2x^2y\bar{a}_x + (x^2 + z)\bar{a}_y + yz^3\bar{a}_z$
   (e) Explain what do you mean by skin depth for lossy media with respective to signal passing through lossy media. **5**

2. (a) Derive maxwells integral and point form of equation for static fields. **10**
   (b) Find electric field intensity $\bar{E}$ due to an infinite line charge. **10**

3. (a) Define the polarization of wave. Explain different types of polarization. **10**
   (b) Derive boundary condition for electric and magnetic fields at the boundary of two dielectric media. **10**

4. (a) Explain in detail FDM method also state advantage and drawback of it. **10**
   (b) State Poynting theorem and derive the average poynting vector. **10**

5. (a) Derive the Expression for radiation power of Hertizen antenna. **10**
   (b) Explain the principle modes of operation of helical antenna and draw its radiation pattern. **10**

6. Solve any two :
   (a) Classify and explain different type of wave propagation **10**
   (b) Explain the significance of the term "effective area of an antenna", Derive the relationship between effective area and directivity of any antenna. **10**
   (c) Explain following terms; critical frequency, virtual height, maximum usable frequency. **10**

E/ ETRX / Sem-V- CBSGS / Signals & System / Nov-16

QP Code : 591402

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** out of remaining **five** questions.
(3) Assume suitable data wherever necessary.

1. (a) Justify the need of z-Transform for the analysis of DT system and Laplace Transform for the analysis of CT system in transform domain. **5**
(b) Show that the O/P of LTI system is linear convolution of input signal x(n) and impulse response h(n). **5**
(c) Find the autocorrelation of $x(n) = (0.2)^n u(n)$ and comment on the value of autocorrelation function at n = 0. **5**
(d) Derive the expression for power of a periodic signal using Parseval's theorem. Calculate the average power of the following signal x(t). **5**
$x(t) = \sin(3000\ \pi t) + \cos(2000\ \pi t)$

2. (a) Classify the following signals as periodic/Non periodic. If periodic then find period. **4**
(i) $x(t) = 12 \cos(3t) + 31 \sin(7t)$
(ii) $x(n) = 2.3 \sin(0.4\ \pi n) + 4.5 \cos(0.3\ \pi n)$

(b) Classify the following signals as energy signal/power signal/neither energy nor power signal **4**
(i) $x(t) = e^{-2t} u(t)$
(ii) $x(n) = n\ u(n)$
(c) Classify the following systems as linear/non-linear system, Time invariant/time variant system, Static/dynamic system **12**

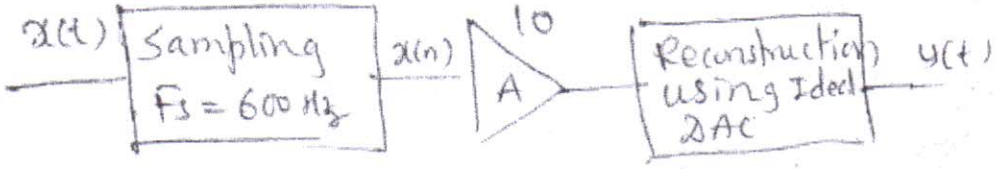
(i) $y(t) = 4\ x(t) + 2\ \frac{dx(t)}{dt}$

(ii) $y(n) = x(2n) + x(n - 1) + 10$

3. (a) Given that $x_1(t) = e^{-at}$ $0 \le t \le T$
$x_2(t) = 1$ $0 \le t \le 2T$
Perform the convolution of $x_1(t)$ and $x_2(t)$ using Graphical method. **10**

[TURN OVER

(b) The signal $x(t) = 10 \sin(720\pi t) + 40 \sin(480\pi t)$ is sampled with sampling freqency Fs = 600 Hz and the sampled signal is upscaled by a factor of 10 as shown in figure below **10**



Find the reconstructed continuous Time signal y(t) using ideal interpolation technique of reconstruction.

4. (a) The Differential equation of system is given below

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{d\,x(t)}{dt} + 2.x(t)$$

(i) Find impulse response of system. **5**

(ii) Find step response of system. **5**

(b) Determine the complete response of the system described by the equation **10**

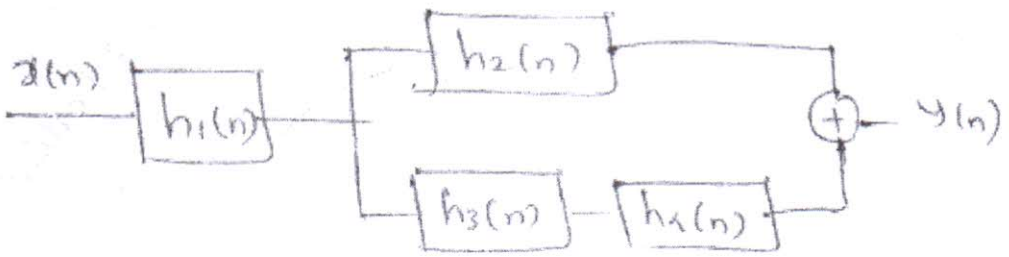
$$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 4y(t) = \frac{d\,x(t)}{dt}$$

With initial conditions $y(0) = 0$

$$\frac{dy(t)}{dt}\bigg|_{t=0} = 1$$

and input $x(t) = e^{-2t}\,u(t)$

5. (a) Consider a DT system as shown in figure below **10**



Given that $h_1(n) = \{1, 2, 4\}$
$\uparrow$

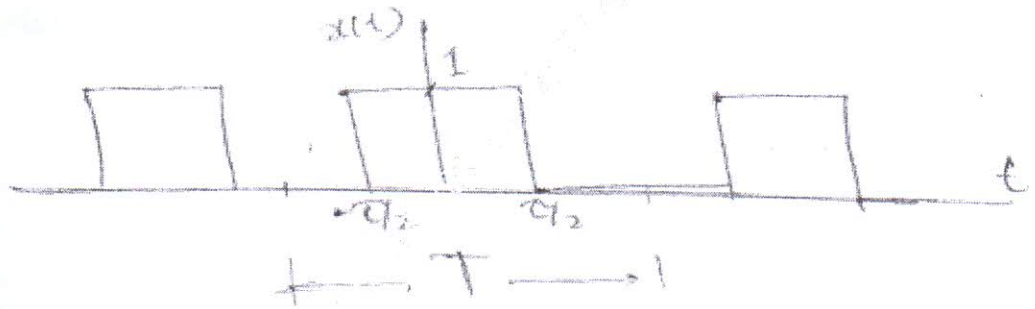
$h_2(n) = u(n) - u(n-3)$
$h_3(n) = \delta(n-1)$
$h_4(n) = \delta(n) + 2\delta(n-1) + 3\delta(n-3)$
Find overall transfer function of system. 10

(b) A certain LTI system is given below

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$$

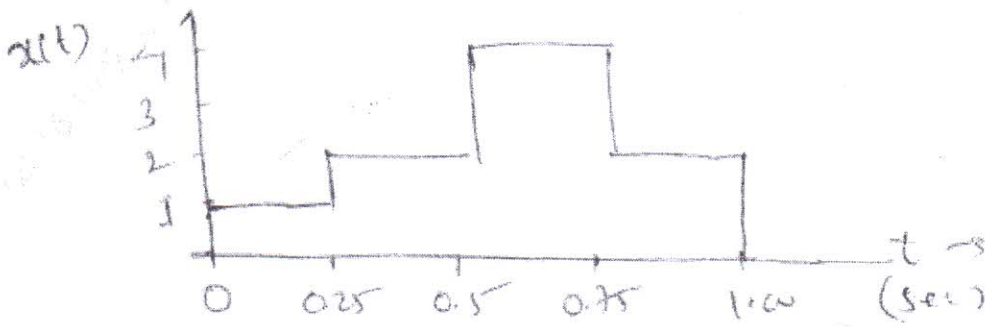
Specify ROC and determine h(n) for the following cases :
Case 1 System is causal
Case 2 System is stable 10

6. (a) Determine the Fourier series representation of the periodic pulse function given below with period T = 1 sec and pulse width $\tau = 0.25$ sec. Plot magnitude spectrum.



10

(b) Find Fourier transform of the following signal using properties of Fourier Transform. 10



E/E7RX/SEM-V(CBSGS)/Digital Communication/
Nov-16.

Q.P. Code : 591502

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

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

1. Answer the following questions: **20**
   (a) What is the significance of AWGN channel.
   (b) What is the capacity of a Gaussian channel and state its importance.
   (c) Differentiate between QPSK and OQPSK.
   (d) Discuss on code efficiency and Hamming bound.
   (e) Explain the significance of eye pattern.

2. (a) Develop MSK waveform (with all intermediate waveforms) for the given bit stream 11000111 for m=5 & n=1 on the graph paper. **10**
   (b) A (7 ,4) cyclic code is generated using the polynomial $x^3 + x + 1$ **10**
      (a) Generate the systematic cyclic code for the data 1100.
      (b) Draw the encoder & show how parity bits are generated for the data 1100.

3. (a) Compare BASK, BFSK & BPSK based on following parameters:- bandwidth requirement, noise immunity, transmission rate, efficiency & applications. **10**
   (b) The parity check matrix [H] of linear (7,4) block code is as follows; **10**

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

   (i) Find generator matrix
   (ii) Determine the code vector for: M1= 1010 & M2= 1110.
   (iii) Draw the encoder using shift registers & EX-OR gates.
   (iv) Obtain syndrome matrix for following received sequences: R1=0100101 & R2=1110100
   (v) Comment on syndrome calculated in above (d).

TURN OVER

4. (a) A three digit message is transmitted over a noisy channel having a probability of error Pe = (2/5) per digit. 10
   (i) Determine Probability of occurrence of errorless message.
   (ii) Determine Probability of message having error in any two digits
   (iii) Determine Probability of message having error in all digits
   (iv) Plot the all possible probabilities of occurrence of error

   (b) Compare the direct sequence spread spectrum (DSSS) and frequency-hop spread spectrum (FHSS) with respect to principle and performance. Explain processing gain and jamming margin. 10

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

   (b) A discrete memoryless 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

   Construct : (a) Huffman Code for each symbol.
   (b) Shannon Fano Code for each symbol

   Determine following parameters for both coding methods (a) and (b):
   (i) Average Code-word length
   (ii) Entropy
   (iii) Code Efficiency
   (iv) Code Redundancy

6. (a) Draw signal space diagram for 16-QAM system and compare probability of occurrence of error in it with QPSK system. 10

   (b) State Nyquist's Criterion for distortion less Transmission. State its significance in Duo-binary encoding. 10
