TE-SEM:V - EXTC (UBGS) NOV-2016

M.C.A.

Q.P. Code : 587900

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

N. B.: (1) Question No. **1** is **compulsory**.
(2) Solve any **three** from remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if necessary and mention the same in the answersheet.

Q1

a Differentiate between microprocessor and microcontroller. 5
b Explain 8051 assembler directives. 5
c Short Note: CPSR. 5
d List and explain design metrics of an Embedded System. 5

Q2

a Explain PORT 1 structure of 8051. 10
b Design a microcontroller system using 8051 microcontroller, 8kB EPROM & 8kB RAM. 10

Q3

a WAP for 8051 microcontroller to generate a square waveform of frequency 1kHz and 50% duty cycle at pin P1.1. Assume 8051 is operating at frequency 12MHz. 10
b Interface 8051 with DAC 0808, WAP to generate a triangular waveform. 10

Q4

a Draw and explain data flow model of ARM7. 10
b Explain register organization of ARM7. 10

Q5

a Explain ARM following instructions: 10

```
CMP r0, r1, LSR#7      ADD r2,r1,r0      LDR r10,[r1]
AND r1,r1,#3           OR r2,r2,#3
```

b Explain digital camera as an example of embedded system. 10

Q6 Short Notes:

a Interrupt structure of 8051. 10
b Timer modes 8051. 10

T.E. Sem V (EXTC) CBGS Integrated Circuits 19/12/2016

Q. P. Code : 588202

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

NB.: **(1)** Question **no.1** is **compulsory.**
(2) Solve **any three** questions from the remaining **five.**
(3) Figures to the right indicate full marks.
(4) Assume suitable data if required and mention the same in the answer sheet.

1. Solve any five. **20**
(a) Draw the diagram for grounded load voltage to current converter and derive the expression for the output current.
(b) Explain simple current limit protection circuit in voltage regulators.
(c) Compare ideal and practical opAmp.
(d) How LM317 is used as adjustable voltage regulator.
(e) Explain working of peak detector.
(f) Draw mod-10 counter using IC7493.

2. (a) Draw the diagram of a monostable multivibrator using timer IC555. With the help of waveforms at the trigger input, across the charging capacitor and at the output explain its working. Design the same for pulse width of 11ms. **10**
(b) Draw the functional block diagram of IC723 Voltage regulator and Explain its working as a basic low voltage regulator. Design the same for an output of 5V and load current upto 200mA. **10**

3. (a) Explain working of RC phase shift Oscillator with the help of neat circuit diagram and derive expression for frequency of oscillation. **10**
(b) With the help of a neat diagram, input and output waveforms and voltage transfer characteristics explain the working of non inverting schmitt trigger. Derive the expressions for the upper and lower threshold levels. Explain how these levels can be varied. **10**

4. (a) With the help of neat circuit diagrams explain the working of universal shift register IC74194 as a ring counter and twisted ring counter. **10**
(b) With the help of neat diagram explain working of IC74163 synchronous 4-bit binary counter. Also illustrate cascading connections for IC74163 based counter. **10**

TURN OVER

5. (a) What is precision rectifier? Explain working of full wave precision rectifier with the help of neat diagram and waveforms. **10**

(b) Draw circuit diagram of antilog converter and derive expression for its output voltage. **10**

6. Write Short notes on any four. **20**

(a) Window detector

(b) Programmable gain amplifier.

(c) IC 534 multiplier

(d) IC74181 Arithemetic Logic Unit.

(e) Monolithic Switching Regulator.

****

T.E. (EXTC) Sem V

22/11/16

Random Signal Analysis

Q.P. Code : 587802

(03 Hrs.) **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 necessary

Q1. (a) Explain any two properties of autocorrelation function. 05

(b) State and explain Chebyshev's inequality. 05

(c) State Central Limit theorem and give its significance. 05

(d) State and explain Bayes' theorem. 05

Q2. (a) A two dimensional Random variable has the following pdf, 10

$$f_{XY}(x,y) = kxye^{-(x^2+y^2)}, x \geq 0, y \geq 0$$

Find
(i) Value of constant K.
(ii) Marginal density of X and Y.
(iii) Conditional densities of X and Y.
(iv) Check for independence of X and Y.

(b) In a communication system, a zero is transmitted with probability 0.3 and a one is transmitted with probability 0.7. Due to noise in the channel, a zero is received as one with probability 0.2 . Similarly, a one is received as zero with probability 0.4. Now, 10
(i) What is the probability that a one is received?
(ii) It is observed that a one is received. What is the probability that zero was transmitted?
(iii) What is the probability that an error is committed?

Q3. (a) If the joint pdf of (X,Y) is given as , 10

$$f_{XY}(x,y) = e^{-(x+y)} \quad x \geq 0, y \geq 0$$

Find the probability density function of (U,V), where $U = \frac{X}{X+Y}$ and V= X+Y.
Are U and V independent?

(b) Define Moment Generating function of a Random variable. If X is a RV discrete or Continuous, then show that its nth raw moment is given as, 10

$$E(X^n) = \frac{d^n Mx(t)}{dt^n} \text{ at t=0.}$$

[Turn Over

Q4. (a) Let X1,X2,X3,..... be sequence of Random variables. 10
Define (i) Convergence almost everywhere
(ii) Convergence in probability
(iii) Convergence in distribution
(iv) Convergence in mean square sense
for the above sequence of Random variable X.

(b) Prove that if input to an LTI system is WSS process , then its output is also a WSS process. 10

Q5. (a) A Random process is given by $X(t)= A \cos(\omega t + \theta)$, where A and ω are constants and θ is a Random variable that is Uniformly distributed in the interval $(0, 2\pi)$. Show that X(t) is a WSS process and it is Correlation ergodic. 10

(b) Explain Power spectral density and prove any two of its properties. 10
The power spectrum of a WSS process is given by,

$$S(\omega) = \frac{10\omega^2+25}{(\omega^2+4)(\omega^2+9)}$$

Find its autocorrelation function

Q6. (a) State and prove Chapman-Kolmogorov equation 10

(b) The transition probability matrix of a Markov chain {Xn} n=1,2,...., having three states 1,2 and 3 is, 10

$$P = \begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix} \end{array}$$

The initial probability distribution is $p^{(0)} = (0.7,\ 0.2\ ,0.1)$

Find (i) $P(X_2) = 3$
(ii) $P(X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2)$

-------END------

TE (EXTC) CBGS Sem V

Analg Communicatins

13/12/20

Q.P. Code : 588102

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

N.B. : (1) Question **No.1** is **compulsory**.
(2) Attempt **any three** questions out of remaining **five**.
(3) **Figures** to the **right** indicate **full marks**.
(4) Assume suitable **data** if **required** and **mention** the same in **answer sheet**.

1. Solve **any four** :- **20**
   (a) Justify why FM is more immune to noise.
   (b) Define noise factor and noise figure.
   (c) What is Pre-emphasis? Why is it used? Sketch and explain pre-emphasis circuit.
   (d) What is quantization? Explain types of quantization.
   (e) Why AGC is required in receivers? Differentiate between simple AGC and Delayed AGC.

2. (a) With neat block diagram explain filter method of SSB generation. State its drawbacks. **10**
   (b) Explain practical diode detector with delayed AGC. **10**

3. (a) The antenna current of AM broadcast transmitter modulated to the depth of 40% by an audio sine wave is 11 Ampere. It increases to 12 Ampere as a result of simultaneous modulation by another audio sinewave. What is the modulation index due to this second wave? **10**
   (b) Derive mathematical expression for FM wave and its modulation index. **10**

4. (a) Explain the operation of Foster seely discriminator with the help of circuit diagram and phasor diagram. **10**
   (b) In a broadcast superhetrodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input to the mixer) is 100. **10**
      (i) If the intermediate frequency is 455kHz, calculate the image frequency and its rejection at 1000kHz and at 25MHz.
      (ii) In order to make the image frequency rejection of the receiver as good at 25MHz as it was at 1000kHz, calculate the loaded Q which an RF amplifier for this receiver would have.

TURN OVER

5. (a) State and prove sampling theorem for low pass band limited signal. **10**
   (b) With the help of block diagram and waveform explain generation and detection of Pulse Width Modulation. **10**

6. Write short notes on **any four** of the following :- **20**
   (a) ISB Receiver.
   (b) Aliasing error and Aperture effect.
   (c) Slope overload distortion and granular noise.
   (d) Frequency Division Multiplexing (FDM).
   (e) Noise in communication system.

RF Modelling & Antennas
TE Sem V CBG-S EXTC
03/12/16

Q.P. Code : 588000

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

N.B. 1) Question No.1 is Compulsory.
2) Solve any three questions from the remaining.
3) Assume suitable data wherever necessary and justify the assumption.
4) Draw suitable diagrams wherever required.

1. a) Compare Binomial filter and chebyshev filter. **05**
   b) Compare Broadside and Endfire array. **05**
   c) find the gain of an Antenna when physical aperature is $5m^2$ at 2GHz with efficiency 70%. **05**
   d) Compare monopole, Dipole and folded dipole antenna. **05**

2. a) Design a composit high pass filter by image parameter method with the following specification. **10**
   $R_o = 75\ \Omega$, $f_c = 50$ MHz, $f_\infty = 48$ MHz.
   b) Derive rediation resistance of small dipole. Explain its significance. **10**

3. a) Derive Friss transmission formula state its significance in wireless communicaiton. **10**
   What is maximum power received at a distance of 0.75 km over free space for 1GHz frequency. The system consist of transmitting antenne with 3dB gain and receiving antenna with 17dB gain and antenna is fed with 200 W power.
   b) Explain the structure and functioning of Yagi Uda antenna. **10**

4. a) Find the radiation pattern for an array of 4 elements fed with same amplitude and opposite phase. Find its HPBW and BWFN. **10**
   b) Draw the structure of microstrip antenna. Discuss its characteristics, limitations and applications. **10**

5. a) Describe parabolic reflector antenna and its different feeding methods. **10**
   b) Explain important features of loop antenna. Discuss use of loop antenna in radio direction finding. **10**

6. **Write short notes on :** **20**
   a) RF field effect transistor
   b) Binomial array
   c) RF behavior of capacitor and inductor
   d) Helical antenna

****