

T. E. EXTC Sem IV (CBQS) . 4/12/14 .
Analog Commn.

QP Code : 14945

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Questions 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 shut.

1. Solve any five : 20
 - (a) Modulation index for AM should be less than one. Justify /Contradict.
 - (b) Distinguish between narrow band FM and wideband FM.
 - (c) Define noise figure and signal to noise ratio.
 - (d) Explain double spotting with reference to radio receiver.
 - (e) Explain aliasing error and aperture effect.
 - (f) List the application of pulse communication.

2. (a) Explain low level and high level modulation techniques with the help of diagram. 10
(b) Explain Practical diode detector with delayed AGC in detail. 10

3. (a) Explain the principle and working of transistor direct PM Modulator. 10
(b) With suitable diagram, explain the working of stabilized reactance modulator. 10

4. (a) Explain independent sideband receive in detail. 10
(b) For a receiver with IF and RF frequencies of 455 KHz and 900 KHz respectively 10
Determine :
 - (i) The Local Oscillator frequency
 - (ii) Image frequency
 - (iii) Image rejection ratio for a pre-selector Q of 80.

5. (a) Explain Pulse Code Modulator and demodulator using neat diagram. 10
(b) What are the drawbacks of delta modulation. Explain the method to overcome these 10
drawbacks.

6. (a) Draw the FDM system to combine three voice channels. Each voice channel occupies a 10
bandwidth of 4 KHz. The common voice channel has a bandwidth of 12 KHz from 100
KHz to 112 KHz.
(b) Classify and explain different types of noise affecting communication. 10

RF Modeling & Antennas

QP Code : 14910

(3 Hours)

[Total Marks : 80

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

(2) Attempt any 3 (three) out of the remaining 5 (five) questions.

(3) Assume suitable data wherever necessary. Justify the assumption.

(4) Draw suitable diagrams wherever necessary.

1. (a) Compare striplines and Microstrip lines. 5
- (b) Explain the significance of Retarded magnetic vector potential and Retarded electric Scalar potential. 5
- (c) With suitable example explain pattern Multiplication for Antenna Arrays. 5
- (d) Explain how Richard's Transformation and unit elements are useful in RF filter designing. 5
2. (a) Explain with equivalent circuits the RF behavior of Resistor, Inductor and Capacitor. 10
- (b) Design a maximally flat LPF with a cut-off frequency of 2GHz; generator and Load Impedance of 50Ω ; and with 15 dB Insertion Loss at 3 GHz with discrete LC components. 10
3. (a) Using Image Parameter method design a Low-pass composite filter with a cut-off frequency 2 MHz and Impedance of 75Ω . Place the Infinite attenuation pole at 2.05 MHz. 10
- (b) Derive Array factor of N-element liner array, where all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls and secondary maxima. 10
4. (a) Design a broadside Dolph-Chebyshev array of 6 elements with spacing 'd' between the elements and with a major to minor lobe ratio of 26 dB. Calculate the excitation coefficients. 10
- (b) Explain the working principle of Yagi-Uda Antenna and draw its radiation pattern. Mention its applications. 10
5. (a) Explain the structure of Microstrip Antenna. Discuss its feed mechanisms and Applications. 10

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(b) Explain the following terms related to Basic Antenna concepts with relevant equations :- 10

- (a) Radiation Resistance
- (b) Effective aperture
- (c) Beam width
- (d) Directivity
- (e) Antenna efficiency.

6. Write short notes on the following :-

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- (a) Friss Transmission formula
 - (b) Ground effect in Antenna
 - (c) Near field and far field Radiation related to Antenna
 - (d) Log Periodic Antenna.
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T.E. EXTC sem V (CBGS)
Microcontrollers & Apps

24/11/14

QP Code :14870

(3 Hours)

[Total Marks : 80

- Question number 1 is compulsory
- Solve any three out of remaining

Q1. A. Explain Concept of Cortex-A, the Cortex-R, and the Cortex-M. (5 marks)

Q1 B. Explain SCON register of 8051. (5 marks)

Q1 C. Explain features of ARM 7. (5 marks)

Q1 D. Write short note on CPSR. (5 marks)

Q2. A. Draw and explain internal structure of Port 0 and Port 3 of 8051. (10 marks)

Q 2. B. Design a microcontroller system using 8051 microcontroller, 8 KB EPROM & 8 KB RAM.
(10 marks)

Q3. A. Interface 8051 with four, 7- segment displays and write assembly language program to display "2014". (10 marks)

Q.3 B.. Interface 8051 with DAC 0808. WAP to generate a triangular waveform. (10 marks)

Q4. A. Draw and explain dataflow model of ARM7. (10 marks)

Q 4 B . Design an IR based wireless communication system . (10 marks)

Q5 A Explain ARM instructions (10 marks)

- a. CMP R0, R1, LSR #7
- b. ADDS Rd, Rm, Rs
- c. LDR Rd,[Rs]
- d. CMN R0,R1
- e. AND R0,R0,#3

Q5. B. Explain digital camera as an example of embedded systems. (10 marks)

Q6 A. Timer modes of 8051. (10 marks)

Q6. B Addressing modes of ARM 7. (10 marks)

GN-Con.:7765-14.

T.E. sem V (CBGS) (EXTC),
RSA

18/11/14.

QP Code : 14830

(3 Hours)

[Total Marks : 80

- N.B :** (1) Question No.1 is compulsory.
(2) Solve any **three** out of remaining **five** questions.
(3) **Assume** suitable **data** if needed.

1. (a) State and explain : 20
(i) Independent Events
(ii) Joint and conditional probabilities of events
(b) Explain what is moment generating function and why is it called so?
(c) State central limit theorem with its importance.
(d) Define Markov chain giving an example.
(e) Explain Bayes theorem and total probability theorem.
2. (a) Two dice with faces 1, 2, 3, 4, 5, 6 are thrown and the sum of the faces is counted. 10
Plot the probability mass function for the sum of the faces. What is the probability that the product of the faces is 12?
(b) X and Y are two random variables for which joint pdf is given by $P(x = i, Y = j) = c(i + j)$ $i = 1, 2, 3, 4; j = 1, 2, 3$ find c and conditional mean and variance of X given $Y = 1$. 10
3. (a) For a certain communication channel the probability that '0' is received as '0' is 0.8 while the probability that '1' is received as '1' is 0.95. If probability of transmitting 0 is 0.45. find 10
(i) a '1' is received
(ii) '1' was transmitted given that '1' was received
(iii) Probability that error has occurred.
(b) If X and Y are exponential distributions with unity parameter, find the probability distribution function of 10
 $U = X + Y$ $V = X/(X + Y)$
4. (a) Let X_1, X_2, X_3, \dots be sequence of Random variables. 10
Define :
(i) Convergence almost everywhere
(ii) Convergence in probability
(iii) Convergence in mean square sense
(iv) Convergence in distribution.
For the above sequence of the Random variable X.
- (b) What is Power spectral Density? Explain its significance. Find the power spectral density of random process given by $X(t) = a \cos(bt + Y)$ where Y is a random variable uniformly distributed over $(0, 2\pi)$. 10

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QP Code : 14830

5. (a) Define autocorrelation function of a WSS random variable. List the properties of Autocorrelation Function of Random Process and prove any two properties. Also give one practical application of Autocorrelation function. 10
- (b) State Chapman-Kolmogorov equation. Transition probability matrix of Markov Chain is 10

$$\begin{array}{c} 1 \\ 2 \\ 3 \end{array} \begin{array}{c} 1 \quad 2 \quad 3 \\ \left[\begin{array}{ccc} 0.5 & 0.4 & 0.1 \\ 0.3 & 0.4 & 0.3 \\ 0.2 & 0.3 & 0.5 \end{array} \right] \end{array}$$

Find the limiting probabilities.

6. (a) Prove that if input LTI system is WSS the output is also WSS. What is Ergodic process? 10
- (b) A random process is defined by $X(t) = 10 \cos(100t + \theta)$ where θ is uniformly distributed in $(0, 2\pi)$. Verify whether $X(t)$ WSS random Process and correlation ergodic. 10
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I.C.

QP Code : 14979

[3 Hours]

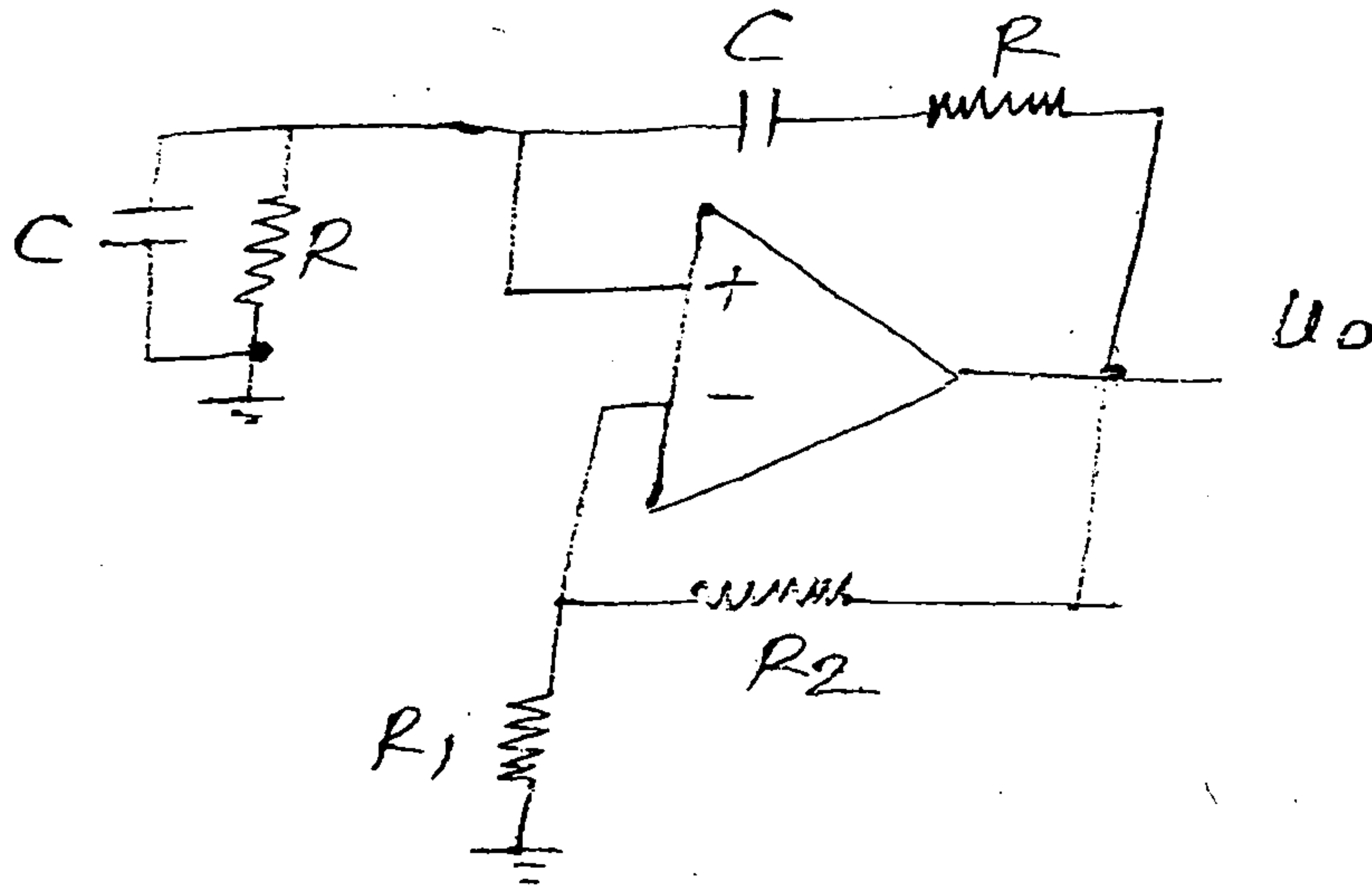
[Total Marks: 80

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

1. Solve any **five**:— 20
- What is input offset voltage and output offset voltage of an Op Amp. How to measure it practically.
 - With the help of a neat circuit diagram explain a voltage to current converter with ground load.
 - What is difference between ordinary rectifier and precision rectifier.
 - Explain any application of waveform generator XR2206 with the help of a neat diagram.
 - With the help of a neat diagram explain how current fold-back protection is achieved in voltage regulators.
 - Draw mod-10 counter using IC 7493.
2. (a) Draw the circuit diagram for a finite gain second order low pass filter. Obtain the expression for its transfer function. What is the effect of interchanging the resistance & capacitance in the circuit? 10
- (b) What is the advantage of an instrumentation amplifier over a difference amplifier. Draw the circuit diagram for an instrumentation amplifier with variable gain using 3 op-amps and derive the expression for its output voltage. 10
3. (a) With the help of a neat diagram and waveforms at the trigger input, across the capacitor and at the output, explain working of 555 as a Monostable multivibrator. Find the values width of 5ms. 10
- (b) Draw the circuit diagram for a square and triangular waveform generator using op-amps. With the help of waveforms at suitable points in the circuit explain its working. If the duty cycle is to be varied, what modification is required in the circuit. If the output of the square wave is to be clipped to $\pm V_x$ how is it obtained? 10
4. (a) With the help of a function block diagram explain the working of voltage regulator LM317 to give a output voltage variable from 6V to 12V to handle maximum load current of 500mA. 12
- (b) Explain the difference between linear voltage regulator and switching voltage regulator. 4

(c) Identify the circuit shown below and explain its working.

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5. (a) Draw the circuit diagram for an Excess-3 decade counter using IC74163 and explain its working with the help of waveforms.

10

(b) With the help of a neat circuit diagram explain the working of universal shift register IC 74194.

10

6. Write short notes on any four:—

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- (i) Phase Locked Loop IC565
- (ii) Precision rectifier.
- (iii) Schmitt trigger.
- (iv) Sample & Hold circuit.
- (v) Window detector.