T.E / EXTC / Sem V / CBSGS / RSA / 20/11/17

Q.P. Code: 23105

(3 Hours) Max Marks: 80

Note:
1. **Question No. 1 is compulsory.**
2. **Out of remaining questions, attempt any three questions.**
3. **Assume suitable additional data if required.**
4. **Figures in brackets on the right hand side indicate full marks.**

Q.1. (A) State the three axioms of probability. (05)

(B) State Central limit theorem and give its significance. (05)

(C) State various properties of autocorrelation function and power spectral density function. (05)

(D) Define and explain Moment Generating Function. (05)

Q.2. (A) In a communication system a zero is transmitted with probability 0.4 and a one is transmitted with probability 0.6. Due to noise in the channel a zero can be received as one with probability 0.1 and as a zero with probability 0.9, similarly one can be received as zero with probability 0.1 and as a one with probability 0.9. If one is observed, what is the probability that a zero was transmitted? (10)

(B) A random variable has the following exponential probability density function: $f(x) = Ke^{-x}$. Determine the value of K and the corresponding distribution function. (10)

Q.3. (A) A distribution has unknown mean μ and variance 1.5. Using Central Limit Theorem find the size of the sample such that the probability that difference between sample mean and the population mean will be less than 0.5 is 0.95. (10)

(B) Explain Strong law of large numbers and weak law of large numbers. (05)

(C) If $Z = X/Y$, determine $f_Z(Z)$. (05)

Q.4. (A) Explain power spectral density function. State its important properties and prove any two of the property. (10)

(B) Explain (i) M/G/1 Queuing system.
(ii) M/M/1/∞ Queuing system. (05)

(C) Write short notes on the following special distributions. (05)
i) Poisson distribution
ii) Gaussian distribution.

Q.5. (A) State and prove Chapman-Kolmogorov equation. (10)

(B) A stationary process is given by $X(t) = 10 \cos [100 t + \theta]$ where θ is a random variable with uniform probability distribution in the interval $[-\Pi, \Pi]$. Show that it is a wide sense stationary process. (10)

P.T.O.

Q.P. Code: 23105

Q.6. (A) Prove that if input to LTI system is w.s.s. then the output is also w.s.s. (1

(B) The transition probability matrix of Markov Chain is given by, (1

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

Find the limiting probabilities?

Sem-X / Nov-Dec-2017 / ExTc / MCA 24/11/17

Q.P. Code :25313

[Time: 3 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 out of remaining questions.
3. Figures to the right indicate full marks.
4. Assume suitable data where necessary.

Q. 1 a) Explain the concepts of Cortex-A, Cortex-R and Cortex-M. 05
b) Compare instructions ACALL and LCALL of 8051. 05
c) What is significance of RESET in microcontroller? How to implement manual and power on reset in 8051? 05
d) Explain features of ARM 7. 05

Q. 2 a) Explain memory management mechanism in ARM 7. 10
b) Explain PORT 1 structure of 8051. 10

Q. 3 a) Write an assembly language program for 8051 to arrange series of ten 8 bit numbers in ascending order. Series starts from memory address 2500H onwards. 10
b) Interface DAC 0808 to 8051 and write assembly program to generate triangular waveform. 10

Q. 4 a) Design 8051 based system with following specifications. 10
i) 8051 is working at 10 MHz
ii) 8 KB External Program memory using 4 KB chips
iii) 16 KB External Data memory using 8 KB chips
b) Explain operating modes of ARM 7. 10

Q. 5 a) Explain characteristics of Embedded System with examples. 05
b) Explain Stepper motor controller as Embedded System. 05
c) Explain addressing modes of ARM 7. 10

Q. 6 a) Explain interrupt structure of 8051. 10
b) Interface LCD to 8051 and write assembly language program to display message "HELLO" on it. 10

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T.E / Sem V / EXTC / RFMA / CBSGS / 30/11/17

QP CODE : 22617

(3 Hours) Marks : 80

N.B. : (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 necessary and mention the same in answer sheet.

Q.1 Attempt **any four** out of the remaining **five** [20]

a) Explain hazards of electromagnetic radiation.

b) Explain how Richard's transformation and unit elements are useful in RF filter designing.

c) Explain near field, inductive field and radiation field related to antenna.

d) Explain pattern multiplication for antenna array.

e) What are characteristics of Horn antenna ?

Q.2 a) Design a low pass composite filter with cut-off frequency 3 MHz and impedance of 75 Ω. Place infinite attenuation pole at 3.08 MHz. [10]

b) Explain with equivalent circuits the RF behaviour of resistor, capacitor and inductor. [10]

Q.3 a) Design a maximally flat low pass filter with a cut-off frequency of 2 GHz, impedance of 50 Ω, and at least 15 dB insertion loss at 3 GHz. [10]

b) Explain in detail dipole antenna. Compare dipole, monopole and folded dipole antennas. [10]

Q.4 a) Derive radiation resistance of infinitesimal dipole. [10]

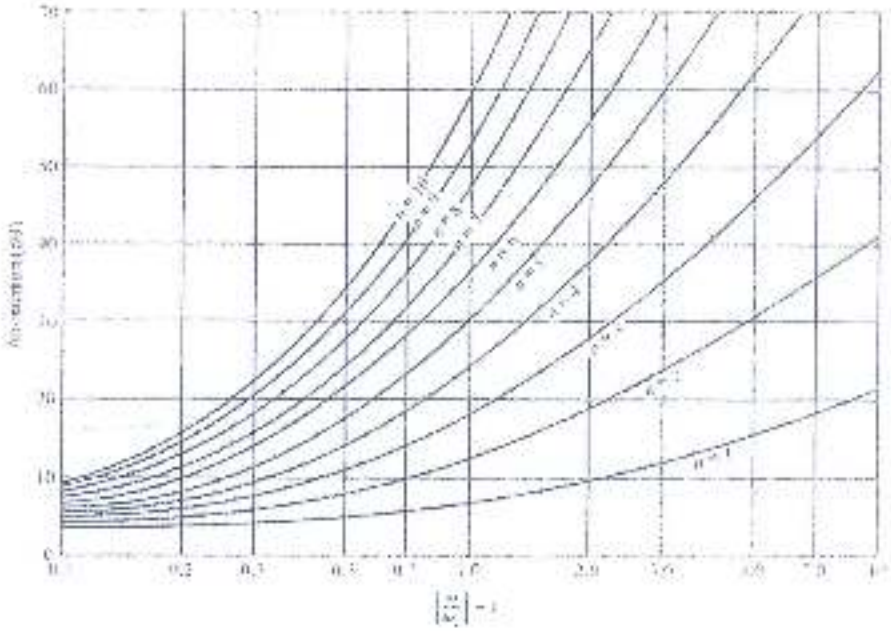
b) Find the radiation pattern of an array of 2 isotropic point sources fed with same amplitude and opposite phase and spaced $\lambda/2$ apart. Find its HPBW and FNBW. [10]

Q.5 a) Explain working principle of Yagi-Uda antenna and draw its radiation pattern. Mention its applications. [10]

b) Draw the structure of microstrip antenna. Discuss its characteristics, limitations and applications. [10]

Q.6 Write short notes on the following : [20]

a) Friss transmission formula
b) Log periodic antenna
c) Helical antenna
d) Principle of parabolic reflector antenna



Attenuation versus normalized frequency for maximally flat filter prototypes.
Adapted from G. L. Matthaei, L. Young, and E. M. T. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures*, Artech House, Dedham, Mass., 1980, with permission.

Element Values for Maximally Flat Low-Pass Filter Prototypes ($g_0 = 1$, $\omega_c = 1$, $N = 1$ to 10)

N	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}	g_{11}
1	2.0000	1.0000									
2	1.4142	1.4142	1.0000								
3	1.0000	2.0000	1.0000	1.0000							
4	0.7654	1.8478	1.8478	0.7654	1.0000						
5	0.6180	1.6180	2.0000	1.6180	0.6180	1.0000					
6	0.5176	1.4142	1.9318	1.9318	1.4142	0.5176	1.0000				
7	0.4450	1.2470	1.8019	2.0000	1.8019	1.2470	0.4450	1.0000			
8	0.3902	1.1111	1.6629	1.9615	1.9615	1.6629	1.1111	0.3902	1.0000		
9	0.3473	1.0000	1.5321	1.8794	2.0000	1.8794	1.5321	1.0000	0.3473	1.0000	
10	0.3129	0.9080	1.4142	1.7820	1.9754	1.9754	1.7820	1.4142	0.9080	0.3129	1.0000

Source: Reprinted from G. L. Matthaei, L. Young, and E. M. T. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures*, Artech House, Dedham, Mass., 1964, with permission.

T.E/ Sem V / CBSGS / EXTC / A.C / 08/12/14

Q.P. Code :25244

[Time: Three Hours] [Marks:80]

Please check whether you have got the right question paper.

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.

Q.1 Solve any four 20

a) Explain the function of AFC loop in FM.
b) What do you mean by double spotting?
c) What is quantization? Explain types of quantization.
d) Why IF is selected as 455 KHz in AM?
e) Define noise figure and noise factor.

Q.2 a) Draw the block diagram of phase cancellation SSB generator and explain how carrier and unwanted sidebands are suppressed? 10

b) An AM transmitter radiates 5 MHz carrier with 80KW power, carrier is modulated by 600HZ and 2 KHz signals. 10
1. What will be the total modulation index if each signal modulates at 60% of modulation?
2. Determine the transmitted power.
3. Draw the frequency spectrum of modulated signal.
4. What is % of power saving if one of the sideband and carrier is suppressed?

Q.3 a) Explain the operation of Foster Seeley discriminator with the help of circuit diagram and phasor diagram. 10

b) Explain the principle and generation of indirect method of FM generation. 10

Q.4 a) What are the drawbacks of delta modulation? Explain the method to overcome these drawbacks. 10

b) State and prove sampling theorem for band limited signal. 10

Q.5 a) Explain super heterodyne radio receiver in detail with block diagram. 10

b) Explain the principle and working of transistor direct PM Modulator 10

Q.6 Write short notes on: (any four) 20

a) PLL-FM demodulator
b) μ – law and A-law companding
c) Vestigial sideband w.r.t broadcast television
d) Frequency division duplexing (FDM)
e) Pre emphasis and de-emphasis circuit
f) Aliasing error and aperture effect

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TE / Sem V / EXTC / CBSGS / IC / 14/12/17

Q.P. Code: 23102

(3 Hours) [Total Marks: 80]

N.B.: (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 necessary and mention the same in answer sheet.

Q.1 **Attempt any 4 questions:** [20]

(A) Give any five features of IC 555.

(B) How does precision rectifier differ from conventional rectifier?

(C) In a Fig. 1(C) using multiplier IC AD534, show that the output voltage is

$$V_O = \frac{(V_1^2 - V_2^2)}{10}.$$

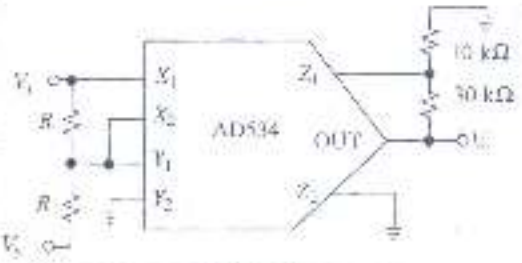

Fig. 1(C)

(D) Draw a neat circuit diagram and input-output waveforms of an inverting Schmitt trigger. Give the expressions for its threshold levels.

(E) If the input to the ideal comparator shown in the Fig. 1(E) is a sinusoidal signal of 8 volt peak to peak without any DC component, then check whether the duty cycle of the output of comparator is 33.33% or 25% or 20%. Prove it.

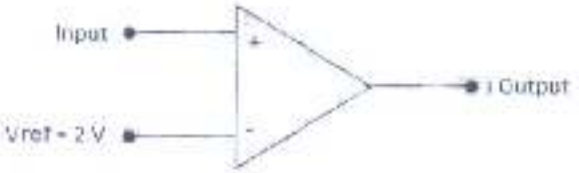

Fig. 1(E)

Q.2 (A) With the help of a neat circuit diagram explain any one application of PLL 565. [10]

(B) Design a square wave generator using IC 555 for an output frequency of 5 kHz and an adjustable duty cycle of 70% to 90%. [10]

Q.3 (A) Draw a neat circuit diagram of a Wein bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillation to be 10 kHz? [10]

(B) Draw a neat circuit of voltage to current converter with floating load and derive the expression for its output current. [10]

Q.4 (A) Design a Second order Butterworth non-inverting high pass filter to provide a cut-off frequency of 5 KHz and pass band gain of AF=2. [10]

(B) Design a counter for counting a sequence 5, 6, 7, 8,...15, 5... using MSI 74163 IC. The pin terminology and functionality of MSI 74163 is given in Fig. 4(B). [10]

Inputs				Current State				Next State			
CLR	LD	ENT	ENP	QD	QC	QB	QA	QD+	QC+	QB+	QA+
clear	0	X	X	X	X	X	X	0	0	0	0
load	↑	0	X	X	X	X	X	D	C	B	A
hold	↑	1	0	X	X	X	X	QD	QC	QB	QA
hold	↑	1	1	X	X	X	X	QD	QC	QB	QA
1	1	↑	↑	0	0	0	0	0	0	0	1
1	1	↑	↑	0	0	0	1	0	0	1	0
1	1	↑	↑	0	0	1	0	0	0	1	1
1	1	↑	↑	0	0	1	1	0	1	0	0
1	1	↑	↑	0	1	0	0	0	1	0	1

Fig. 4(B)

Q.5 (A) With the help of functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 5 V to 10 V to handle maximum load current of 500 mA. [10]

(B) What is an instrumentation amplifier? Draw its neat circuit using three op-amps. Design instrumentation amplifier for variable gain of 0.5 to 100. [10]

Q.6 **Write short notes on: (Attempt any two)** [20]

(A) Current fold-back protection in IC 723.

(B) Sample and Hold Circuit.

(C) IC74181 Arithmetic Logic Unit.

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