Sem-V (COBSas) / EXTC / Microcontrollers & Applications /

May 2016

QP Code : 31103

(3 Hours) [Total Marks : 80]

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.**

1. (a) Explain Concept of Cortex-A, the Cortex-R, and the Cortex-M . 5

(b) Compare AJMP, SJMP and LJMP instructions of 8051 5

(c) What is Stack ? How it is implemented in 8051? 5

(d) Which are the basic features adopted from RISC architecture to enhance the performance of ARM architecture? Explain in short two of them . 5

2. (a) Explain exceptions and interrupt handling in ARM 7 . 10

(b) Explain PORT 1 structure of 8051. 10

3. (a) Write an Assembly language program for 8051 to copy a block of data 10 bytes long from RAM locations starting at 35H to RAM locations starting at 60H. 10

(b) Interface HEX keypad and seven segment display to 8051 and write assembly language program to display the key pressed on the display. 10

4. (a) Write a assembly language program to generate a rectangular waveform of frequency 1 KHz and 70% duty cycle at pin P1.1 using 8051. Assume 8051 is operating at frequency 12 MHz. 10

(b) What is pipeline concept of ARM 7 architecture, explains it with proper block diagram. How it affects the system performance? 10

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5. (a) What are the challenges in optimizing embedded system design matrices ? 5

(b) Explain IR based wireless communication system design. 5

(c) Explain addressing modes of ARM 7. 10

6. (a) Explain interrupt structure of 8051 10

(b) Write assembly language program for 8051 to transfer message "WELCOME" serially at baud rate of 9600 in mode 1. Assume that 8051 operates at frequency 11.0592 MHz. 10

TE/EXTC/SEM-V(CBSGS)/Analog Communications/MAY-16

Q.P. Code : 31187

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

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

1. Solve any **four** of the following :— **20**
   (a) Why IF is selected as 455 KHz in AM ?
   (b) Distinguish between narrow band FM and wideband FM.
   (c) What are the causes of fold over distortion ? How it can be prevented ?
   (d) Explain double spotting with reference to radio receiver.
   (e) Define noise figure and signal to noise ratio.

2. (a) One input to AM modulation is 500 KHz carries with an amplitude of 20 Vp. The second input is 10 KHz modulating signal that is of sufficient amplitude to cause a change in o/p wave of ± 7·5 Vp. Determine. **10**
      (i) Upper and Lower side frequency
      (ii) Expression for modulated wave
      (iii) Draw o/p spectrum
      (iv) Modulation co-efficient and percent modulation
      (v) Total tranmitted power.
   (b) Explain practical diode detector with delayed AGC. **10**

3. (a) Explain indirect method of FM generation. **10**
   (b) Explain ratio detector in detail with suitable diagram. **10**

4. (a) Explain independent sideband technique in detail. **10**
   (b) Explain Super heterodyne radio receiver in detail with block diagram. **10**

5. (a) Explain block diagram of adaptive delta modulator with waveforms. **10**
   (b) State and prove sampling theorem for pass band signal. **10**

6. Write short notes on any **four** of the following :— **20**
   (a) PLL FM Demodulator
   (b) Quadrature Amplitude Modulation
   (c) TDM and FDM
   (d) Companding
   (e) Aliasing Error and aperture effect.

E/EXTC/Sem-V(CBSGS)/Random Signal Analysis

May' 16

QP Code : 31061

(03 Hours) Total Marks: 80

N.B.:

1) Question Number 1 is Compulsory
2) Attempt any Three questions from the remaining Five questions
3) Assumptions made should be clearly stated.
4) Use of normal table is permitted

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1 Answer the following

a) For an LTI system with stochastic input prove that autocorrelation of output is given by convolution of cross-correlation (between input-output) and LTI system impulse response. 05

b) Suppose that a pair of fair dice are tossed and let the RV X denote the sum of the points. Obtain probability mass function and cumulative distribution function for X. 05

c) If $Z = X + Y$ and if X and Y are independent then derive pdf of Z as convolution of pdf of X and Y. 05

d) Write a note on the Markov chains. 05

2a) Define and Explain moment generating function in detail. 05

b) Let $Z = X/Y$. Determine $f_Z(z)$ 05

c) The joint cdf of a bivariate r.v. (X, Y) is given by

$$F_{XY}(x,y) = (1 - e^{-\alpha x})(1 - e^{-\beta y}), x \geq 0, y \geq 0, \alpha, \beta > 0$$
$$= 0 \text{ otherwise.}$$

i) Find the marginal cdf's of X & Y. 02
ii) Show that X & Y are independent. 02
iii) Find $P(X \leq 1, Y \leq 1)$, $P(X \leq 1)$, $P(Y > 1)$ & $P(X > x, Y > y)$ 06

3a) Explain strong law of large numbers and weak law of large numbers. 05

b) Write a note on birth and death queuing models. 05

c) A distribution with unknown mean μ has variance equal to 1.5. Use central limit theorem to find how large a sample should be taken from the distribution in order that the probability will be at least 0.90 that the sample mean will be within 0.5 of the population mean. 10

4a) State and prove Chapman-Kolmogorov equation. 05

b) State and prove Bayes theorem. 05

c) (i) State any three properties of power spectral density. 03
(ii) If the spectral density of a WSS process is given by 07

$$S(w) = b(a - |w|)/a, \quad |w| \leq a$$
$$= 0 \quad , \quad |w| > a$$

Find the autocorrelation function of the process.

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Sem V (CBSGS) ExTC May 2016.

RF Modeling & Antennas.

QP Code : 31146

Max. Marks: 80 Marks **Duration: 3 Hrs**

N.B

(1) Question No. 1 is Compulsory
(2) Solve any three from remaining questions
(3) Assume suitable data wherever required.

QuestionNo.		Max.Marks
Q1		
(a)	Explain the Hazards of Electromagnetic Radiation.	20
(b)	Explain the radiation mechanism of antenna with single wire system.	
(c)	Explain the use of Richard transformation and Kurodas Identity in RF filter design	
(d)	Derive an expression for array of two isotropic sources with same amplitude and in phase.	
Q2 (a)	Explain the RF behavior of resistor, capacitor and inductor.	10
(b)	Discuss the design procedure for filter using image parameter method.	10
Q3 (a)		10
	Design a maximally flat LPF with a cut off frequency of 2 GHz. The generator and load impedance is 50 Ω with 15 dB insertion loss at 3GHz with discrete LC components.	
(b)		10
	Derive an expression for array factor of N element linear array, where all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls and secondary maxima.	
Q4 (a)	A radio link has 15 watt transmitter connected to an antenna of 2.5 m^2effective aperture at 5 GHz. The receiving antenna has an effective aperture of 0.5 m^2 and is located at a15 km line of sight distance from transmitting antenna. Assume lossless antennas. Find power delivered to the receiver.	10
(b)	Derive an expression for E field and H field of infinitesimal dipole antenn	10

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Q5 (a) What is the folded dipole Antenna? Draw its typical structure and explain working mechanism. Give its advantages. 10

(b) What is Dolph- Chebyshev array? Explain the steps involved in design of Dolph-Chebyshev array. 10

Q6. **Write short notes** 20

(a) Ground effects on Antenna

(b) Log periodic Antenna

(c) Loop antenna

(d) Horn antenna

T.E / EXTC / SEM V (CBSGS)

MAY 16

INTEGRATED CIRCUITS

QP Code : 31228

(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.

1. Solve the following (any **five**) :– **20**
   (a) Compare open loop & closed loop configurations of operational amplifier.
   (b) Draw the diagram of a floating load voltage to current converter and derive the expression for the output current.
   (c) Differentiate between inverting & non-inverting comparators.
   (d) Explain the functional block diagram of timer 555.
   (e) Explain current fold-back protection in voltage regulators.
   (f) Draw the waveforms for the outputs of IC 7490 with respect to the clock when it is used as a bi-quinary decade counter.

2. (a) Draw a neat circuit diagram for an instrumentation amplifier using three op-amps & derive the expression for its gain. Explain how the gain can be varied. **10**
   (b) Draw a neat diagram of a Wien bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R & C if its frequency of oscillation = 1 kHz? **10**

3. (a) With the help of a neat diagram & voltage transfer characteristics explain the working of a non-inverting Schmitt trigger. Derive the expressions for the threshold levels & explain how they can be varied. **10**
   (b) Draw the circuit diagram for a square and triangular waveform generator using operation amplifiers. With the help of waveforms at suitable points in the circuit explain its working. Explain how the duty cycle can be varied. **10**

4. (a) Design a voltage regulator using IC 723 to give output voltage of 15 V and output current of 1.5 A. **10**

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(b) With the help of a neat diagram explain how IC LM 317 can be used as a variable voltage regulator. 6

(c) Differentiate between linear regulator & switching regulator. 4

5. (a) Draw the diagram for an astable multivibrator using timer 555. Design the same for a frequency of 5 KHz with duty cycle 70%. Draw the waveforms across the charging capacitor and at the output. 10

(b) With the help of a neat circuit diagram explain the working of universal shift register IC 74194 as a 4 bit, 4 state ring counter with single circulating 'zero'. 10

6. Write short notes on any **four** :– 20

(a) Frequency to voltage converter

(b) Waveform generator XR 2206

(c) Voltage controlled ascillator 566

(d) Synchronous counter 74163

(e) Arithmetic logic unit 74181