18/6/2011

T.E (ETRX & Biomedical) VI (old)
Analog Integrated Circuits & Appl

VI-April-11-165

Con. 3132–11. RK–2346

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data if **required** and state **clearly**.

1. (a) Draw transfer characteristic of op-amp and give its ideal properties. **5**
   (b) Derive an expression for op-amp as a non-inverting amplifier with its circuit diagram. **5**
   (c) Define V-to-I convertor. Draw and explain floating type V-to-I convertor. **5**
   (d) Give main features of IC 8038. **5**

2. (a) Design an Instrumentation Amplifier using three op-amps for gain variation between 0·5 and 500. **10**
   (b) With a neat circuit and waveform, explain the working of sample and hold amplifiers. **5**

3. (a) Draw a functional diagram of monostable multivibrator using time 555. Derive the expression for the pulse width. **10**
   (b) Draw the circuit diagram for non-inverting schimitt trigger. Explain working and write an equation for V_{LTP} and V_{UTP}. **10**

4. (a) What are the different types of Analog to Digital convertors ? Explain one of the techniques in detail. **10**
   (b) Design a 1 amp current source using a regulator IC. You can take any regulator IC such as IC 7805. **10**

5. (a) Explain with neat circuit diagrams, a full wave precision rectifier. Draw its input and output waveforms. **10**
   (b) Draw the functional block diagram of PLL IC 565 and explain its working. **10**

6. (a) Design a second order KRC low-pass filter using equal component design for f_o = 1 kHz and φ = 5. What is its dc gain ? **10**
   (b) Draw a neat circuit of Log Amplifier and derive its output expression. **10**

7. Write a notes on any **two** of the following :– **20**
   (a) Switched Capacitor Filters
   (b) Voltage-to-frequency Convertor
   (c) Peak Detectors.

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9/6/2011

T.E ETRX VT (Old)
Discrete Time Signal Processing

Con. 3787-11. (OLD COURSE) RK-2343

(3 Hours) [Total Marks : 100

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

1	a	Compare IIR and FIR systems	5
	b	Test the following systems for linearity and time-invariance: i) $y(n) = \lvert x(n) \rvert$ ii) $y(n) = \cos[x(n)]$	5
	c	Compute the DFT of the sequence $x(n) = \cos(n\pi/2)$ for $N = 4$	5
	d	A causal discrete time system has the difference equation $y(n) = x(n) - 0.4y(n-1) - 0.25y(n-2)$. What is the ROC of this system?	5
2	a	If $x(n) = \{1,2,3,4\}$ and $h(n) = \{-3,2,1\}$ are the input and impulse response of an LTI system, find the output.	5
	b	Determine the energy and power of a signal given by $x(n) = \begin{cases} (1/2)^n & n \geq 0 \\ 3^n & n < 0 \end{cases}$	5
	c	If $h(n) = 2^n u(-n-1)$, state whether the system is stable. Justify your answer by drawing h(n) with respect to n.	5
	d	Obtain the cross correlation function between the two sets of data { 1.5, 2.0, 1.5, 2.0, 2.5 } and { 0, 0.33, 0.67, 1.0 }	5
3	a	State and prove the theorem of convolution in Z-transform	6
	b	A discrete time system is represented by $H(Z) = \dfrac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$ Determine all possible signals h(n)	8
	c	If $H(Z) = \dfrac{z^{-1} - 0.2}{1 - 0.2z^{-1}}$, find the passband of the filter	6
4	a	A discrete time LTI system has the transfer function given below: $H(Z) = \dfrac{1 - 0.4z^{-1}}{(1+0.1z^{-1})(1-2z^{-1})}$ Show cascade and parallel realizations of the system	8
	b	A system is described by the difference equation: $y(n) = 0.5\, y(n-1) + x(n)$ Input given to the system is $(1/3)^n u(n)$ and initial condition is $y(-1) = 1$. Determine: i) Zero input response ii) Zero state response iii) Total response	6
	c	Determine the overall impulse response for the cascade connection of two LTI systems having impulse responses $h1(n) = (1/2)^n u(n)$ $h2(n) = (1/4)^n u(n)$	6

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5	a	A certain discrete time system has the following poles and zeros: $Z_1 = 0, Z_2 = -1/3, Z_3 = -1/6$ $P_1 = 1/2, P_2, P_3 = 0.8\, e^{\pm j\pi/3}$ If the magnitude response $\lvert H(\omega)\rvert_{\omega=0} = 10/9$, find the gain and complete transfer function of the system.	10
	b	Consider an analog signal $x_a(t) = 5\cos(250\pi t)$. This signal is sampled at the rate of F_s 200 HZ. i) What is the discrete time signal obtained after sampling? ii) What is the frequency $0<F<F_s/2$ of a sinusoid that yields samples identical to that obtained by discretising $x_a(t)$ at the given sampling rate?	10
6	a	Find the output of the system using circular convolution if input $x(n) = \{1,2,3,1,2\}$ and $h(n) = \{2,1,4\}$	6
	b	Define DTFT, Z transform and DFT for a finite length sequence. Hence explain the relationship between these transforms.	6
	c	i) Derive the relations to find DFT of two real N point sequences using only a single N point DFT. ii) Using the above relations, find DFTs of $x_1(n) = \{1,1,1,1\}$ and $x_2(n) = \{2,1,2,1\}$ performing DFT only once.	8
7	a	Find the DFT of the following sequence using DITFFT $x(n) = \{1, 1, 1, 1, 1, 1, 0, 0\}$	10
	b	Compare architectures of DSP processor and microprocessor	5
	c	Explain overlap add method	5

4/6/2011

TE ETRX VT (old)
Communication System

Con. 3999-11. (OLD COURSE) **RK-2349**

(3 Hours) [**Total Marks : 100**

N.B. (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of remaining **six**.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) State and explain Kepplers laws of satellite motion. 5
(b) Define antenna characteristic :— 5
(i) Antenna Beamwidth
(ii) Bandwidth
(iii) Radiation Pattern
(iv) Polarisation
(v) Resistance.
(c) Explain Interlaced Scanning. 5
(d) Explain Blind Speed in Radar System. 5

2. (a) Draw and explain composite video signal in detail. 10
(b) Explain the parabolic reflector antenna in detail. 10

3. (a) Derive the relation for maximum radar range. Explain the factors affecting it. 10
(b) Explain uplink and downlink model in Satellite Communication System. 10

4. (a) What do you understand by color burst signal ? Explain frequency interleaving in colour TV system. 10
(b) Explain VSB correction in TV transmission. 5
(c) Why the no. of lines in TV system to be scanned are kept odd ? 5

5. (a) Explain Broad side array and end fire array alongwith its radiation pattern. 10
(b) Explain the block diagram of CW radar system. State its advantage and limitations. 10

6. (a) Differentiate between GEO, LEO and MEO satellites. 10
(b) Explain the significance of chromacity diagram. 5
(c) Differentiate between resonant and non-resonant antenna. 5

7. Write short notes on :—
(a) TDMA in satellite communication 5
(b) HDTV 5
(c) Additive mixing and subtractive mixing in colour TV 5
(d) AGC circuit. 5

3/5/2011
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T.E. ETRX VT (old)
Computer Dept.

Con. 3374-11. (OLD COURSE) RK-2340

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**
(2) Out of remaining solve any **four**.
(3) **Figures** to the **right** indicate **full** marks.

Q.1 a. Solve using Booth's algorithm 5
Multiplicand M=7and Multiplier Q= 3
b. Write microinstructions for instruction Add Ro,[R3] 5
c .Explain in brief using memory segmentation how 64 Terabytes of Virtual memory address can be accessed? 5
d. Explain data hazard and code hazard in pipelining. 5

Q.2 a.Explain various addressing modes of Pentium processor. 10
b.Explain single bus and multiple bus organization. 10

Q.3a Explain with the help of diagram paging mechanism and role of TLB. 10
b Explain various access methods for I/O devices. 10

Q.4 a. What is cache coherency? Explain various methods to achieve it. 10
b. For the following memory structure show various address fields for i)Direct mapping along with interfacing diagram 10
Main memory=4MB, Cache memory=64KB .

Q.5 a.What is bus arbitration? Explain various methods to resolve bus arbitration . 10
b. Explain microprogrammed control unit. 10

Q.6 a. Explain any one hardwired technique of control unit design. 10
b. Explain operation of a 5 stage pipelining process. 10

Q.7 a. Explain different characteristics of memory. 10
b.Explain various architectures of cache memory. 10

T.E Electronics VI (OLD)
Microwave & Fiber optic communication

111 : 1st half.11-PH(I)

Con. 3570-11. RK-2352

(OLD COURSE)

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if **necessary**.

1. Answer any **five** from the following :– 20
   (a) Draw ray diagrams to illustrate the propagation path of light energy in single mode step index and single mode graded index fibers.
   (b) Draw the refractive index profile of a W-index fiber. What is its significance ?
   (c) Obtain the s-matrix for magic Tee.
   (d) With the help of a schematic diagram, show the division of field lines in the auxilliary arms of E-plane and H-plane tees.
   (e) Differentiate between TE_{mn} modes and TM_{mn} modes in rectangular waveguides.
   (f) Give two advantages and two disadvantages of LASER over LED source.

2. (a) Obtain the solution of wave equations for TE_{mn} modes in rectangular waveguide. 10
   (b) Define group velocity and phase velocity for a wave propagating in rectangular waveguide. Derive the relation between them. 10
   A waveguide has a cutoff frequency of 3·75 GHz. Find the group velocity of this rectangular waveguide at 5 GHz.

3. (a) Explain the constructional details and working of a GUNN diode. 10
   (b) Explain different types of absorption losses in glass fibres. How are they dependent on the wavelength of light ? 10

4. (a) Explain the working of a two cavity Klystron amplifier with the help of a neat diagram. Obtain the expression for the modulated velocity of electrons in a two cavity Klystron tube. 10

(b) A two cavity Klystron amplifier has the following specifications : $V_0 = 1000$ V, $R_0 = 40$ kΩ, $I_0 = 25$ mA, $f = 3$ GHz. Gap spacing in either cavity, $d = 1$ mm, spacing between the two cavities, $L = 4$ cm. Effective shunt impedance excluding beam loading, $R_{sh} = 30$ kΩ :— 10

(i) Find the input gap voltage to give maximum voltage V_2.

(ii) Find the voltage gain neglecting the beam loading in the output cavity.

5. (a) What are cross field devices ? Explain the working of cavity magnetron with the help of a schematic diagrams. 10

(b) Obtain the expression for the numerical aperture of an optical fiber in terms of refractive indices of care and cladding. An optical fiber has refractive index of 1·6 for the core and 1·4 for the cladding. Calculate the critical angle, numerical aperture and maximum angle of acceptance. 10

6. (a) What are different types of dispersion mechanisms seen in optical fibers ? Explain them in brief. 10

(b) Explain the term 'mode' in an optical waveguide. What are the different modes in fiber guides ? Distinguish between them in terms of E-field and H- field profiles. 10

7. Explain in brief any **four** of the following :— 20

(a) Faraday rotation isolator.

(b) S-parameters.

(c) Splices and connectors in optical cables.

(d) Cavity resonators

(e) Optical detectors.