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06EC61

Sixth Semester B.E. Degree Examination, June/July 2011
Digital Communication

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. Missing data be suitably assumed.

PART – A

1 a. Briefly explain the various basic signal processing operations in a digital communication system. **(06 Marks)**

b. Consider the message signal $g(t) = A\cos(2\pi f_o t)$. Plot the spectrums of the discrete-time signal $g_\delta(t)$ derived by sampling g(t) for the sampling rates: i) $f_s = f_o$, ii) $f_s = 3f_o$. **(06 Marks)**

c. A low pass signal g(t) is sampled to get s(t) using flat top sampling method. Obtain the expression for the sampling signal s(t) and its spectrum. Hence show that flat top sampling leads to amplitude distortion, and explain how it is corrected during reconstruction. **(08 Marks)**

2 a. Explain the three basic functions of a regenerative repeater in a PCM system, with a block diagram of the regenerative repeater. **(06 Marks)**

b. Five message signals $g_1(t)$, $g_2(t)$, $g_3(t)$, $g_4(t)$ and $g_5(t)$ having bandwidths 2 KHz, 2 KHz, 2 KHz, 3 KHz and 3 KHz are to be transmitted on a time division multiplexed basis using a common channel. Setup a scheme for accomplishing this multiplexing requirement with each message signal sampled at its Nyquist rate. Find the minimum transmission bandwidth of the channel. **(06 Marks)**

c. Derive an expression for the output signal-to-quantization noise ratio of a uniform quantizer in terms of step size of the quantizer. Hence, show that for a mid-tread type uniform quantizer the SNR is $(SNR)_o = (6n - 7.2)\,dB$ where "n" is the number of bits per sample. Assume a loading factor of 4 in the qunatizer. **(08 Marks)**

3 a. A delta modulator system is designed to operate at 10 times the Nyquist rate for a signal with a 10 KHz bandwidth. Determine the maximum SNR for a 8 KHz input sinusoid assuming no slope over load error. **(04 Marks)**

b. With a neat block diagram, explain how an optic fiber link is used for the transmission of digital data. **(08 Marks)**

c. Consider a random binary sequence where bits are statistically independent and equally likely. Determine the power spectral density for the NRZ polar format representation of the binary sequence. Plot the power spectra. **(08 Marks)**

4 a. A computer puts out binary data at the rate of 64 kilobits per second. The output is transmitted using a base band binary PAM system that is designed to have a raised cosine spectrum. Determine the transmission bandwidth required for each of the following roll off factors : i) $\alpha = 0.0$ ii) $\alpha = 0.5$ iii) $\alpha = 0.75$ iv) $\alpha = 1.0$ **(05 Marks)**

b. The binary data 0011011101 are applied to the input of a duobinary system with precoder. Construct the precoder output, duobinary coder output and corresponding receiver output for (i) initial bit 0, (ii) initla bit 1. Suppose that due to error during transmission, the level produced by second digit is reduced to zero. Construct the new receiver output. Write the necessary equations and procedures at each step. **(10 Marks)**

c. Write a short note on EYE PATTERN. **(05 Marks)**

PART – B

5 a. With the block diagrams of QPSK transmitter and receiver, explain the generation and demodulation of a QPSK wave. **(08 Marks)**

b. The binary sequence 11001000110 is applied to a DPSK transmitter. Draw the block diagram of the transmitter. Illustrate the generation of the DPSK signal and sketch the resulting waveform at the DPSK transmitter output. **(08 Marks)**

c. An FSK system transmits binary data at the rate of 2×10^6 bits per second. During the source of transmission, AWGN of zero mean and two sided power spectral density 10^{-20} watts per hertz is added to the signal. The amplitude of the received sinusoidal wave for digit 1 or 0 is 1 microvolt. Determine the average probability of symbol error assuming non-coherent detection. **(04 Marks)**

6 a. Using the Gram-Schmidt orthogonalization procedure, find a set of orthonormal basis functions to represent the 4 signals $s_1(t)$, $s_2(t)$, $s_3(t)$ and $s_4(t)$ shown in the Fig.Q6(a) below. Express each of these signals in terms of the set of basis functions. **(12 Marks)**

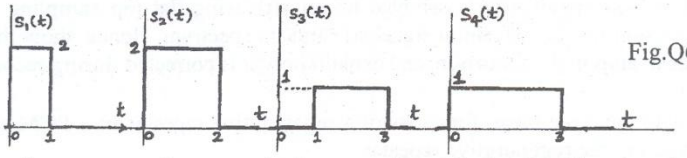

Fig.Q6(a)

b. Explain the importance of geometric interpretation of signals. Illustrate the geometric representation of signals for the case of a 2-dimensional signal space with 3 signals. **(08 Marks)**

7 a. With block diagrams of a detector and vector receivers, explain the working of a correlation receiver. **(08 Marks)**

b. What is a matched filter? Show that the spectrum of the output signal of a matched filter with the matched signal as input is proportional to the energy spectral density of the input signal. **(06 Marks)**

c. Consider the signal s(t) shown in Fig.Q7(c). Determine the impulse response of the matched filter. Plot the impulse response and the matched filter output as a function of time.

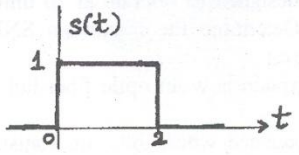

Fig.Q7(c)

(06 Marks)

8 a. A periodic PN sequence (maximum-length sequence) of period 7 is given : $\{C_n\}$ = 00111010011101---. State and verify the balance property and run property of the sequence. **(05 Marks)**

b. A spread spectrum communication system has the following parameters :
Information bit duration = T_b = 4 milli secs , PN chip duration = T_c = 2 micro secs.
Find the bit rate of the binary data, PN sequence length, bandwidth of the PN sequence and processing gain of the system. **(05 Marks)**

c. What is frequency hop spread spectrum? Describe the working of a frequency hop spread MFSK system employing slow-frequency hopping technique. **(10 Marks)**

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06EC62

Sixth Semester B.E. Degree Examination, June/July 2011

Microprocessors

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Missing data be suitably assumed.

PART – A

1 a. Explain the "look ahead" features of 8086 processor. **(08 Marks)**

b. With suitable examples, explain PSW in 8086 processor. **(06 Marks)**

c. The opcode for MOV instruction is 100010. Determine the machine language code for the following instructions :

i) MOV AL, BL ii) MOV, AX, BX
iii) MOV AL, [BX] iv) MOV AX, DS : [BP + SI]
v) MOV AL, [1234h] vi) MOV AL, 34h [BX] [DI] **(06 Marks)**

2 a. Determine whether the following instructions are valid or not. If valid, explain their operation and flags affected, if not valid mention the reason :

i) XLAT AL ii) MOV BX, [DX]
iii) NOT 34h iv) AAD
v) TEST OPR1, OPR2 vi) JNGE label. **(06 Marks)**

b. Write a program to check whether the given string is palindrome or not. Accept the string through keyboard and print a suitable message, as "PALINDROME" or "NOT PALINDROME". **(06 Marks)**

c. What are assembler directives? Explain the significance of the following assembler directives with suitable examples:

i) LENGTH ii) TYPE iii) DB iv) EQU **(08 Marks)**

3 a. List the string primitives. Explain them with suitable examples. **(08 Marks)**

b. Write 8086 MACRDs to accept a data from keyboard and to display result on CRT screen. Using above macros, write a program to add two unpacked BCD numbers. **(06 Marks)**

c. Write an algorithm and a program to convert the given four digit BCD data to its equivalent Hexadecimal value. **(06 Marks)**

4 a. Explain the interrupt structure of 8086. Write the functions of atleast five dedicated software interrupts in 8086. **(08 Marks)**

b. Write a scheme to generate NMI interrupt on power failure and explain. **(06 Marks)**

c. Write subroutines to perform the following in 8086 processor :

i) Set trap flag
ii) Reset trap flag **(06 Marks)**

PART – B

5 a. With relevant interface diagrams, write a flowchart and program code for 4 × 4 matrix keyboard detect, debounce and encode procedure. **(10 Marks)**

b. Write an algorithm and a program for an 8086 procedure to drive the stepper motor. Assume the desired direction of rotation is passed to the procedure in AL (AL = 1 is clockwise, AL = 0 is counter-clockwise) and the number of steps is passed to the procedure in CX. Also assume full-step mode and the delay of 20 ms between each step. Show the necessary interfacing details. **(10 Marks)**

6 a. Represent 178.625 using 80 bit temporary real format. Use hex format for expressing the answer. **(04 Marks)**

b. Explain the following instructions of 8087 coprocessor with suitable examples :
i) FILD ii) FXCH iii) FLDPI iv) FINIT **(08 Marks)**

c. Draw the formats of STATUS and CONTROL registers of 8087 NDP and define each bit. **(08 Marks)**

7 a. Draw a timing diagram to execute a memory write operation in minimum mode of 8086 processor and explain. **(06 Marks)**

b. What are the different status that are given out on the bus $\overline{S}_2$, $\overline{S}_1$ and $\overline{S}_0$ in maximum mode of 8086? How different control signals are generated from this bus? Explain briefly each of these control signals. **(08 Marks)**

c. Explain the operation of reset section of 8284A clock generator. **(06 Marks)**

8 a. Explain the function of the following 80386 pins :
i) $\overline{\text{ERROR}}$ ii) $\overline{\text{PEREQ}}$ iii) $\overline{\text{LOCK}}$ iv) $\overline{\text{READY}}$
v) $\overline{\text{ADS}}$ vi) RESET vii) D / $\overline{\text{C}}$ viii) $\overline{\text{NA}}$ **(08 Marks)**

b. Write a note on the internal programming model of the 80486 and depict the EFLAG ..gister in detail. **(07 Marks)**

c. Explain the following with respect to Pentium processor :
i) Branch prediction logic
ii) Cache structure
iii) Super scalar architecture. **(10 Marks)**

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06EC63

Sixth Semester B.E. Degree Examination, June/July 2011
Analog and Mixed Mode VLSI Design

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions selecting at least TWO questions from each part.*
2. Missing data may be suitably assumed.

PART – A

1 a. Explain the characteristics of a sample and hold circuit used in converting analog signals to digital signals. **(06 Marks)**

b. Determine the maximum DNL (in LSBs) for a 3-bit DAC which has the following characteristics. Does the DAC have 3-bit accuracy? If not, what is the resolution of the DAC having this characteristic? **(05 Marks)**

Digital Input	000	001	010	011	100	101	110	111
Voltage output in V	0	0.625	1.5625	2.0	2.5	3.125	3.4375	4.375

c. Explain in detail the issues in mixed signal layouts with reference to:
i) floor planning ii) power supply and grounding issues iii) shielding. **(09 Marks)**

2 a. Explain charge scaling DACs and layout considerations for a binary weighted capacitor array. **(08 Marks)**

b. A 3-bit resistor string DAC was designed with a desired resister of 500 Ω. After fabrication, mismatch caused the actual value of the resistors to be,
$R_1 = 500\Omega$, $R_2 = 480\Omega$, $R_3 = 470\Omega$, $R_4 = 520\Omega$, $R_5 = 510\Omega$, $R_6 = 490\Omega$, $R_7 = 530\Omega$ and $R_8 = 500\Omega$.
Determine the maximum INL and DNL for the DAC assuming $V_{ref} = 5$ V. **(06 Marks)**

c. For a binary weighted current steering DAC, obtain the expression for $|INL|_{max}$ and $|DNL|_{max}$ **(06 Marks)**

3 a. With a neat block diagram, explain the successive approximation ADC. Draw the relevant binary search waveform for a 3-bit with D = 101. **(08 Marks)**

b. Design a 3-bit flash ADC with its quantization error centered about zero LSBs. Determine the worst-case DNL and INL, if resistor matching is known to be 5%. Assume that $V_{ref} = 5V$. **(06 Marks)**

c. Explain with a block diagram, dual slope integrated ADC. **(06 Marks)**

4 a. With a relevant diagram using MOSFETs, explain the 3-stages of a voltage comparator. **(12 Marks)**

b. Explain the concept of analog multiplier. With relevant diagram describe the warping of a CMOS multiplier that uses multiplying quad. **(08 Marks)**

PART – B

5 a. Assuming rms quantization noise voltage to be $V_{LSB}/\sqrt{12}$. Show that averaging the outputs of a data converter will improve SNR. **(05 Marks)**

b. Explain the accumulate and dump circuit used for decimation in ADC. Draw the frequency response of the circuit for various values of K. **(10 Marks)**

c. Describe the bandpass filter implementation using a comb filter and a digital resonator. **(05 Marks)**

6 a. With a neat diagram, explain the CMOS process flow for sub – 0.35μm process. **(07 Marks)**

b. Describe the method of implementation of a floating MOS capacitor. **(06 Marks)**

c. Explain how a simple delay element can be realized using i) pass transistor and ii) clock CMOS logic. **(07 Marks)**

7 a. With a neat circuit, explain the working of a 4-bit pipelined adder. Draw the circuit used for implementing 1-bit full adder. **(10 Marks)**

b. Describe the implementation of a switch using NMOS and PMOS logic. **(06 Marks)**

c. Explain the procedures for selecting the channel length of a MOSFET, in analog circuit design. **(04 Marks)**

8 a. Explain the process of biasing a push-pull amplifier o/p stage with a floating current design. **(05 Marks)**

b. Describe the operation of differential amplifier that uses source follower level shifter for boosting OP-AMP gain. **(07 Marks)**

c. Describe a mixed signal OP-AMP topology. **(08 Marks)**

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06EC64

Sixth Semester B.E. Degree Examination, June/July 2011
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define the term directivity and effective operator of an antenna. Derive the relation for D in terms of A_e. **(08 Marks)**

b. Define the following with respect to antenna
i) Effective height ii) Antenna field zones. **(04 Marks)**

c. Calculate the directivity of the source with the pattern $u = u_m \sin\theta \sin^3\phi$ using
i) Exact method ii) Approximate method. Take $0 \le \theta \le \Pi$ and $0 \le \phi \le \Pi$. **(08 Marks)**

2 a. The power received by the receiving antenna at a distance of 0.5 km over a free space at a frequency of 1 GHz is 10.8mW. Calculate the input to the transmitting antenna if gain of transmitting antenna and receiving antenna is 25dB and 20dB respectively. The gain is with respect to isotropic source. **(06 Marks)**

b. Explain the concept of principle of pattern multiplication with an example. **(06 Marks)**

c. Show that the width of the principle lobe of a uniform end-fire array is grater than that of a uniform broad-side array. **(08 Marks)**

3 a. Derive the field equation for a linear array of n isotropic point sources of equal amplitude and spacing. Explain its operation as i) Broad side array ii) End fire array. **(08 Marks)**

b. 4 isotropic point sources are placed $\lambda/6$ m apart. The power is applied with equal amplitude and a phase difference of $\pi/3$ between adjacent element, determine FNBW. **(06 Marks)**

c. Using exact method, calculate the distance between elements of broadside array whose beam width between first null is found to be 45^0 at a frequency of 10MHz. There are 8 elements in the array. **(06 Marks)**

4 a. Starting from the concept of magnetic vector and electric scale potentials, derive the expressions for the field components of a short dipole for both general care and for field care. **(10 Marks)**

b. Write note on folded dipole antenna. **(04 Marks)**

c. A half wave dipole in free space is radiating with a current of 1A (rms) at the antenna terminals. Find the angle θ for maximum field strength and determine the field strength and power density at a point mile from the antenna at the corresponding angle. **(06 Marks)**

PART – B

5 a. Derive Far field expressions for small loop antenna. **(08 Marks)**

b. Explain the different types of rectangular and circular horn antenna. For rectangular horn write design equation for flare angle. **(06 Marks)**

c. Explain the slot and complementary antennas. **(06 Marks)**

6 a. Explain the axiat mode pattern and the phase velocity of wave propagation on Monofilar Helical antenna. **(10 Marks)**

b. Explain the working of log periodic antenna. **(05 Marks)**

c. Write a note on Embedded and Plasma antenna. **(05 Marks)**

7 a. Explain the propagation of wave by means of i) Surface wave ii) Diffraction. **(10 Marks)**

b. For Tropospheric wave propagation, show that the radius of curvature of path is a function of rate of change of refractive index with height and explain the duct propagation of wave. **(10 Marks)**

8 a. Explain the mechanism of wave reflection from ionosphere. **(06 Marks)**

b. For Ionospheric wave propagation show that attenuation factor is given by $\frac{60\Pi\sigma}{\sqrt{\epsilon_r}}$ **(06 Marks)**

c. A high frequency radio link is established for a range of 2000km. If the reflection region of the ionosphere is at a height of 300km and has a critical frequency of 8MHz. Calculate the maximum usable frequency. Derive the formula used. **(08 Marks)**

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06EC65

Sixth Semester B.E. Degree Examination, June/July 2011
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Justify that the information content of a message is a logarithmic function of its probability of emission. **(06 Marks)**

b. Derive an expression for average information content (entropy) of long independent messages. **(04 Marks)**

c. Given is the model of a Markoff source in Fig.Q1(c).

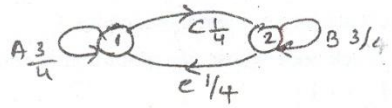

Fig.Q1(c)

Find, i) State probability ii) Entropy of first order source and second order source H(s) and $H(s^2)$ iii) G_1, G_2 iv) Efficiency and redundancy of first order source. **(10 Marks)**

2 a. Explain Shannon encoding algorithm. Design an encoder using Shannon encoding algorithm for a source having 5 symbols and probability statistics P = { 1/8, 1/16, 3/16, 1/4, 3/8 }. Find coding efficiency and redundancy. **(10 Marks)**

b. Explain with a neat block diagram, the digital communication system indicating the various types of communication channels. Also, define the various probabilities and their relationship with respect to coding channel. **(10 Marks)**

3 a. A source emits an independent sequence of symbols from an alphabet consisting of 5 symbols A, B, C, D and E with probabilities P = { 0.4, 0.2, 0.2, 0.1, 0.1 }. Determine Huffman code by, i) Shifting the combined symbols as high as possible. ii) Shifting the combined symbol as low as possible. iii) Find coding efficiency and variance of both the codes. **(10 Marks)**

b. The input to the channel consists of 5 letters X = { x_1, x_2, x_3, x_4, x_5 } and output consists of four letters Y = { y_1, y_2, y_3, y_4 }. The JPM of this channel is given in Fig.Q3(b).

	y_1	y_2	y_3	y_4
x_1	0.25	0	0	0
x_2	0.1	0.3	0	0
x_3	0	0.05	0.1	0
x_4	0	0	0.05	0.1
x_5	0	0	0.05	0

Fig.Q3(b)

i) Compute H(x), H(y), H(xy), H(y/x) and H(x/y)
ii) Rate of data transmission and mutual information.
iii) Channel capacity, channel efficiency and redundancy. **(10 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

4 a. Derive an expression for channel capacity of a binary Erasure Channel. **(06 Marks)**

b. Explain the Shannon Hartley theorem and that $\lim_{B \to \infty} C = 1.44\frac{S}{\eta}$ **(08 Marks)**

c. A CRT terminal is used to enter alphanumeric data into a computer. The CRT is connected through a voice grade telephone line having usable bandwidth of 3 kHz and an output S/N of 10 dB. Assume that the terminal has 128 characters and data is sent in an independent manner with equal probabilities.

i) Find the average information per character.
ii) Find the channel capacity
iii) Find the maximum rate at which the data can be sent from terminal to computer without error. **(06 Marks)**

PART – B

5 a. Explain the matrix representation of linear block codes. **(06 Marks)**

b. Consider a (6, 3) linear block code whose generator matrix is given below.

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

Find, i) All code words ii) All naming weights and distances iii) Minimum weight and minimum distance iv) Parity check matrix v) Draw the encoder circuit. **(14 Marks)**

6 a. A (7, 4) binary cyclic code has a generator polynomial $g(x) = 1 + x + x^3$
i) Write the syndrome circuit ii) Verify the circuit for the message polynomial $d(x) = 1 + x^3$. **(08 Marks)**

b. A (15, 5) binary cyclic code has a generator polynomial $g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$
i) Draw encoder block diagram
ii) Find code polynomial for message polynomial $d(x) = 1 + x^2 + x^4$ in systematic form
iii) Is $v(x) = 1 + x^4 + x^6 + x^8 + x^{14}$ a code polynomial? If not, find the syndrome of v(x). **(12 Marks)**

7 Explain the following error control codes:

i) Golay codes
ii) Shortened cyclic codes
iii) RS codes
iv) Burst and random error correcting codes. **(20 Marks)**

8 Consider the (3, 1, 2) convolutional code with $g^{(1)} = (1\ 1\ 0)$, $g^{(2)} = (1\ 0\ 1)$ and $g^{(3)} = (1\ 1\ 1)$.

i) Find constraint length
ii) Find rate efficiency
iii) Draw the encoder block diagram
iv) Find the generator matrix
v) Find the codeword for the message sequence (1 1 1 0 1) using time-domain and transfer domain approach. **(20 Marks)**

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06EC661

Sixth Semester B.E. Degree Examination, June/July 2011

Programming in C++

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are preprocessor directives? What is their function? Give atleast six examples of preprocessor directives. **(07 Marks)**

b. With an example, explain the data types and variables in C++. **(06 Marks)**

c. Write a program to find the roots of a quadratic equation $ax^2 + bx + c = 0$ using 'switch; and 'CASE'. **(07 Marks)**

2 a. Explain the various looping constructs available in C++ with their syntax. **(07 Marks)**

b. Write a C++ program to input a series of integer numbers and sum them and terminate when the number is zero.
i) using for loop ii) using while loop. **(08 Marks)**

c. Write a C++ program to add the first 15 even numbers and display their sum. **(05 Marks)**

3 a. Describe the various types of operators available in C++ with example. **(06 Marks)**

b. How do you pass an array to a function? Explain with example program. **(08 Marks)**

c. Write a C++ program to calculate area and perimeters of a circle. **(06 Marks)**

4 a. What are the three required statements for every function in C++? Write a program in C++ to add the value from 1 to N using function (N = 10)? **(10 Marks)**

b. What are the advantages of using function? Explain function parameters and parameter passing mechanism (with example program), using swap, two integer numbers. **(10 Marks)**

PART – B

5 a. Define class and object. With the help of general syntax describe a class, class members and class object arrays and vectors. **(10 Marks)**

b. What are class constructor and class destructor? Give the characteristics of each (through example program) to find the length of a string. **(10 Marks)**

6 a. What is operator overloading? With the general syntax explain the process of operator overloading. **(10 Marks)**

b. Write a C++ program to overload the + + and – – operator. **(10 Marks)**

7 a. Explain how new and delete operator manage memory allocation dynamically. **(04 Marks)**

b. Write a C++ program to demonstrate the new and delete operator in overloading. **(06 Marks)**

c. What is inheritance? Explain different types of inheritance. **(10 Marks)**

8 Write short notes on the following : **(20 Marks)**

a. Public, private and protected

b. Local static and global variables

c. Base class and derived class

d. Recursion and inline function.

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06EC667

Sixth Semester B.E. Degree Examination, June/July 2011
Digital System Design using VHDL

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Write a behavioral description for JK flip-flop with asynchronous active low set and reset, along with a model. **(06 Marks)**

b. List the VHDL operators according to highest precedence to lowest precedence. Give example for each class (atleast one). **(08 Marks)**

c. Write the general form of function declaration, function call and procedure declaration procedure call. **(06 Marks)**

2 a. Realize the following functions using nMOS PLA.

$F_0 = \Sigma m\ (0, 1, 4, 6)$; $F_1 = \Sigma m\ (2, 3, 4, 6, 7)$

$F_2 = \Sigma m\ (0, 1, 2, 6)$; $F_3 = \Sigma m\ (2, 3, 5, 6, 7)$ **(06 Marks)**

b. The state graph for Traffic-Light controller is as shown in Fig.Q2(b). Write the VHDL code for the same. **(06 Marks)**

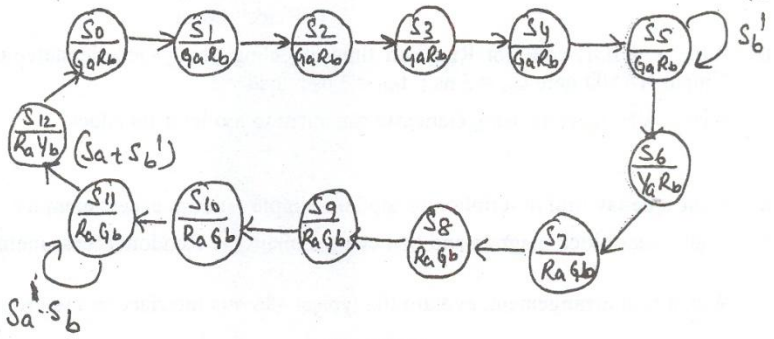

Fig.Q2(b)

c. With relevant waveform and circuit, explain the debouncing and synchronizing action with respect to keypad scanner. **(08 Marks)**

3 a. Obtain the state graph for Faster multiplier. From the state graph, write the behavioral model of Faster multiplier (4×4). **(10 Marks)**

b. With a neat block diagram of parallel binary divider. Hence perform parallel binary operation on $135 \div 13$. **(10 Marks)**

4 a. Derive SM chart for Dice game. From SM chart write the VHDL code for Dice game. **(14 Marks)**

b. Along with SM chart, explain the serially linked state machines. **(06 Marks)**

PART – B

5 a. Explain the working of parallel Adder-subtractor logic cell in Xilinx 3000 series. **(08 Marks)**

b. With necessary arrangements, explain the general purpose interconnects, direct interconnects between adjacent CLBs, vertical & horizontal long lines of programmable interconnects of Xilinx 3000 series. **(12 Marks)**

6 a. Obtain the flow chart for floating-point multiplication. Explain exponent adder and fraction multiplier with relevant block diagram. **(14 Marks)**

b. Discuss the floating point operations on floating point numbers. Give an example for the same. **(06 Marks)**

7 a. The input signal X timing diagram is shown in Fig.Q7(a).

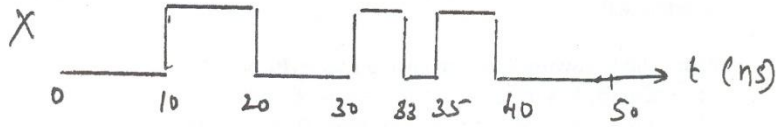

Fig.Q7(a)

Write VHDL statements for : Transport delay
Inertial delay
Reject clause
and its waveforms. **(06 Marks)**

b. Write a VHDL code for Rise/Fall time modeling using Generic statement with respect to 2-input NAND gate $t_{rise} = 5$ ns ; $t_{fall} = 3$ ns ; load = 1. **(07 Marks)**

c. Write a VHDL code using Generate statement to model 4-bit adder. **(07 Marks)**

8 a. Write a behavioral description to model a simple random access memory. **(06 Marks)**

b. With a neat block diagram and SM chart, explain the Random access memory system. **(08 Marks)**

c. With a neat arrangement, explain the typical 486 bus interface to a microprocessor. **(06 Marks)**

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06TE63

Sixth Semester B.E. Degree Examination, June/July 2011

Satellite Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Write short notes on :
   i) Ground reflection
   ii) Diffraction
   iii) Critical frequency
   iv) Atmospheric absorption
   v) Tropospheric scatter. **(10 Marks)**

   b. What are the effects of earth's magnetic field on propagation of radio waves through ionosphere? **(06 Marks)**

   c. Discuss electrical properties of the ionosphere. **(04 Marks)**

2 a. Explain briefly tropospheric wave propagation with the help of its structure. **(10 Marks)**

   b. Write an explanatory note on the services provided by satellites. **(10 Marks)**

3 a. State Kepler's three laws of planetary motion and explain with a neat diagram. **(06 Marks)**

   b. The orbit for an earth-orbiting, satellite-orbit has an eccentricity of 0.15 and a semi-major axis of 9000 km. Determine :
   i) Its periodic time
   ii) The apogee height and
   iii) The perigee height.
   Assume a mean value of 6371 km for the earth's radius. **(04 Marks)**

   c. Explain the following terms :
   i) Inclination
   ii) Argument of perigee
   iii) Mean anomaly
   iv) Right ascension of ascending node
   v) Prograde and retrograde orbit **(10 Marks)**

4 a. Explain what is meant by the GEO. How do the geostationary orbit and a geosynchronous orbit differ? **(06 Marks)**

   b. Show that the range d from an earth station to a geostationary satellite is given by $d = \sqrt{(R \sin El)^2 + h(2R + h)} - R \sin El$, where R is the earth's radius (spherical), h is the height of the geostationary above the equator, and El is the elevation angle of the earth station antenna. **(04 Marks)**

   c. Explain with the help of a neat diagram:
   i) Earth eclipse of satellite phenomenon
   ii) Launching orbits. **(10 Marks)**

PART – B

5 a. Describe the major effects the ionosphere has on the transmission of satellite signals at frequencies (i) 4 GHZ and (ii) 12 GHz. **(06 Marks)**

b. A satellite earth station antenna having a maximum gain of 60 dB at the operational frequency is fed from a power amplifier generating 10 KW. If the feed system has a loss of 2 dB, determine earth station EIRP. **(04 Marks)**

c. Explain what is meant by :
   i) Amplifier noise temperature
   ii) Noise factor
   iii) Saturation flux density
   iv) Input back-off
   v) Output back-off **(10 Marks)**

6 a. Define and explain the terms : i) roll, ii) pitch and iii) yaw with the neat diagram. **(06 Marks)**

b. Explain briefly the need for TT and C in satellite systems. **(04 Marks)**

c. What is a satellite transponder? Describe the station keeping maneuvers in satellite system. **(10 Marks)**

7 a. With a neat diagram, explain the outdoor and indoor units of a receive-only home TV system. **(10 Marks)**

b. What is the channeling scheme used for the speed system? Explain. **(10 Marks)**

8 a. What is meant by TDMA? Explain the need for reference burst. Explain briefly the different components of a reference burst. **(10 Marks)**

b. Compare FDMA with TDMA. **(06 Marks)**

c. Explain satellite-switched TDMA. **(04 Marks)**

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06TE64

Sixth Semester B.E. Degree Examination, June/July 2011
Transmission Lines and Antennas

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting at least TWO from each part.*
2. Use of Smith –Chart permitted.

PART – A

1 a. Derive an equations for voltage and current at any point on a transmission line. **(12 Marks)**

b. Derive and show π - section equivalent circuit for a transmission line. **(08 Marks)**

2 a. The ratio of spacing 'd' t the radius 'a' of an open wire dissipationless line is 25 and the space between the conductors has a dielectric of relative permittivity of 8. Determine :
i) Inductance
ii) Capacitance
iii) Characteristic impedance
iv) Velocity of wave propagation when the line is excited by a source. **(10 Marks)**

b. An antenna as load on a transmission line produces a SWR of 2.8 with a voltage minimum at a distance of 0.12 λ from the antenna terminals. Find the antenna impedance if R_0 of the line is 300 Ω. **(10 Marks)**

3 a. A dissipationless UHF transmission line operating at a frequency of 320 MHz is having characteristic impedance of 300Ω. A short circuited single stub having a length of 15.558 cm is connected at a distance of 5.372 cm from the load termination and on the main line to achieve perfect single stub matching. Determine i) magnitude of phase angle or reflection coefficient ii) The terminated load impedance iii) voltage standing wave ratio before the connection of the single stub. **(10 Marks)**

b. Given $\frac{YR}{Go} = 0.6 - j1$, design a double – stub tuner using smith chart with $\frac{3\lambda}{8}$ spacing between the stubs. **(10 Marks)**

4 a. An antenna has field patterns given by $E\theta = \cos\theta \cos 2\theta$ for $0° \le \theta \le 90°$ find :
Half power bandwidth (H P B W)
Beam width between first nulls (F N B W) **(05 Marks)**

b. Show that directivity $D = \frac{4\pi}{\Omega A}$ related to antenna basics. **(05 Marks)**

c. Derive an expression for effective aperture and directivity of a short dipole antenna. **(10 Marks)**

PART – B

5 a. Derive an expression for field pattern when tow isotropic point sources of same amplitude and phase. **(10 Marks)**

b. Explain the construction and operation of broad side array and end – fire array related to isotropic point source. **(10 Marks)**

6 a. Derive an expression for electric and magnetic fields of short electric dipple. **(10 Marks)**

b. Explain the construction and operation of V–Antenna and Rhombic antennas related to microstrip arrays. **(10 Marks)**

7 a. Derive and find radiation resistance of a small loop and large loop antenna. **(10 Marks)**

b. A rectangular patch with dimensions as given in Fig. Q7(b) has a dielectric substrate of relative permittivity $\epsilon_r = 2.27$ and a thickness $t - \lambda_0/100$ find :

i) Impedance

ii) Bandwidth

iii) Directivity

iv) Length and impedance of $\frac{\lambda}{4}$ section of microstrip transmission line to match the path to a 50 Ω

v) Width of the microstrips. **(10 Marks)**

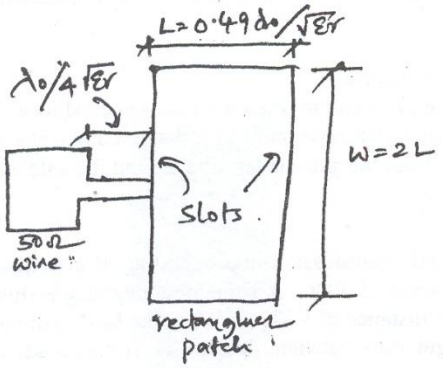

Fig. Q7(b)

8 a. Explain the construction and operation of yagi–uda antenna and plasma antenna. **(10 Marks)**

b. Explain the construction and operation of embedded antenna and parabolic reflectors. **(10 Marks)**

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