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06EC61

Sixth Semester B.E. Degree Examination, May/June 2010
Digital Communication

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. With a block diagram, explain the basic signal processing operations involved in a digital communication system. **(07 Marks)**

b. Explain 'flat-top' sampling, using waveforms and equations. **(07 Marks)**

c. The signal $x(t) = 2\cos 400\pi t + 6\cos 640\pi t$ is ideally sampled at $f_s = 500$ Hz. If the sampled signal is passed through an ideal low pass filter with cut off frequency of 400 Hz:
i) Determine the spectrum of the sampled signal and sketch.
ii) What frequency components will appear in the filter output? **(06 Marks)**

2 a. Write a note on 'TDM'. **(04 Marks)**

b. Show that the signal to quantization noise power ratio of a uniform quantizer is $[SNR]_{dB} = 1.8 + 6n$ and n = number of bits/sample. **(06 Marks)**

c. What is the necessity of non uniform quantization? Explain compounding. **(06 Marks)**

d. A telephone signal band limited to 4 KHz is to be transmitted by PCM. The signal to quantization noise power ratio is to be at least 40 dB. Find the number of levels into which the signal has to be encoded. Also find the transmission band width. **(04 Marks)**

3 a. With neat diagrams, explain the operation of DPCM. **(07 Marks)**

b. A DM system is tested with a 10 KHz sinusoidal signal with 1 V peak to peak at the i/p. It is sampled at 10 times the Nyquist rate. What is the step size required to prevent slope overload? **(04 Marks)**

c. Explain T1 – carrier system. **(05 Marks)**

d. For the binary bit sequence 10110100, draw the waveforms using: **(04 Marks)**
i) Unipolar NRZ ii) Unipolar RZ iii) Polar NRZ iv) Bipolar NRZ.

4 a. Describe Nyquist's criteria for distortionless baseband transmission. **(06 Marks)**

b. Explain the need for a precoder in a duobinary signaling. For i/p binary data 1011101, obtain the o/p precoder and o/p of duobinary coder. Explain how data can be detected at the receiver. **(08 Marks)**

c. What is equalization? Explain adaptive equalization for data transmission. **(06 Marks)**

PART – B

5 a. Explain the working of:
i) Coherent BFSK transmitter and ii) QPSK transmitter. **(10 Marks)**

b. The bit stream 1011100011 is to be transmitted using DPSK technique. Determine the encoded sequence and transmitted phase sequence. Also write the block diagram of the modulator and demodulator for the same and explain. **(10 Marks)**

6 a. A binary data is transmitted using ASK over a AWGN channel at a rate of 2.4 Mbps. The carrier amplitude at the receiver is 1 μV. Noise spectral density $N_o/2$ is 10^{-15} Watt/Hz. Find the average probability of error if the detection is coherent. Take $\in rfc(5) \simeq 3\times10^{-6}$. **(06 Marks)**

b. With a diagram, explain the model of digital communication system. **(08 Marks)**

c. Explain geometric interpretation of signals. **(06 Marks)**

7 a. Explain the detection of known signals in noise. **(10 Marks)**

b. Write a note on minimum mean square error estimate. **(04 Marks)**

c. A polar NRZ waveform is to be received by a matched filter. Binary 1 is represented by a rectangular positive pulse and binary 0 is represented by a rectangular negative pulse. Find out the impulse response of the matched filter and sketch it. **(06 Marks)**

8 a. Mention the applications of spread spectrum system. Explain the principle of direct sequence spread spectrum system. **(08 Marks)**

b. Explain the frequency hopped spread spectrum system. **(08 Marks)**

c. A slow FH/MFSK system has the following parameters:
The number of bits / MFSK symbol = 04
The number of MFSK symbol / hop = 05
Calculate the processing gain of the system in decibels. **(04 Marks)**

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06EC62

Sixth Semester B.E. Degree Examination, May/June 2010
Microprocessors

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Explain in brief the functions of 'execution unit', with a neat block diagram. **(07 Marks)**

b. Explain: i) How physical address is generated by 8086?
ii) 16 byte paragraph boundary.
iii) Segment override prefix. **(06 Marks)**

c. Explain with at least two examples, the register indirect addressing and register relative addressing. Identify the addressing modes for the following instructions: **(07 Marks)**
i) MOV AX, BP [100] ii) XCHG num[BX + SI], SP iii) MOV CL, 'A'

2 a. What are the differences between 8086 and 8088 processors? **(04 Marks)**

b. What is wrong, if any, in the following instructions? Correct them and explain the operation performed by these instructions. **(06 Marks)**
i) ADD [23A5H], AL ii) INC [BX] iii) LEA SI, offset num

c. Write an ALP to add N one byte BCD numbers, store the result in memory location. **(10 Marks)**

3 a. What do you mean by 'assembler directives'? Explain the following assembler directives:
i) ALIGN 16 ii) PROC .... ENDP iii) ASSUME iv) EXTRN....PUBLIC **(05 Marks)**

b. Explain any four conditional branch instructions which check the carry and zero flags simultaneously. **(06 Marks)**

c. Write an ALP to convert a four digit ASCII coded hexadecimal number to its binary equivalent using SEGMENT.....ASSUME directives. **(09 Marks)**

4 a. What are the differences between a MACRO and a PROCEDURE? Write an ALP that displays a carriage return and a line feed using a MACRO. **(10 Marks)**

b. Write an ALP to find the GCD of four numbers using a procedure. **(10 Marks)**

PART – B

5 a. Describe the purpose of interrupt vector table and the condition (s) which causes the microprocessor to perform the following types of interrupts:
type 0, type 1, type 2, type 3 and type 4 **(07 Marks)**

b. Write an interrupt procedure that sets the trap flag to enable trap. **(04 Marks)**

c. Write a program that outputs characters to a printer using INT 17h interrupt. **(09 Marks)**

6 a. Explain the different types of key switches used in a computer. **(05 Marks)**

b. Draw a block diagram of 7 - segment LED display which is interfaced to a microprocessor using dedicated display controller. **(10 Marks)**

c. Explain the different types of floating point numbers stored in the memory by the coprocessor. **(05 Marks)**

7 a. Convert the following:
i) Decimal 1259.125 to single precision number ii) Decimal -29.563 to long real form.
iii) Short real 01011101011001100....0 to decimal. **(09 Marks)**

b. Write an ALP to find the roots of a quadratic equation $x^2 + 3x + 2 = 0$. **(11 Marks)**

8 Write short notes on : a) Minimum and maximum modes of 8086 ; b) Universal serial bus (USB) ; c) Special registers of 80386 ; d) Pentium processor. **(20 Marks)**

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06EC63

Sixth Semester B.E. Degree Examination, May/June 2010
Analog and Mixed Mode VLSI Design

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Explain the characteristics and typical errors associated with sample and hold circuit. **(10 Marks)**

b. Briefly explain the ADC specifications. **(05 Marks)**

c. Find the resolution of DAC, if the output voltage is desired to change in 1 mV increments while using a reference voltage of 4V. **(05 Marks)**

2 a. Explain qualitatively the architecture and working of charge scaling DACs. **(10 Marks)**

b. Design a 3-bit charge scaling DAC and find the value of output voltage for $D_2D_1D_0 = 100$ and 011. Assume $V_{ref} = 5V$, C = 0.5 PF. **(05 Marks)**

c. Briefly explain the architecture & working of a pipeline digital to analog coverter. **(05 Marks)**

3 a. Explain the architecture and working of a flash ADC. **(08 Marks)**

b. If a 10-bit flash ADC is designed, determine maximum offset voltage of comparators which will make INL less than ½ LSB. Assume that resister string is perfectly matched and $V_{REF} = 4V$. **(04 Marks)**

c. Briefly explain the block diagram of a 2-step flash ADC and its working. **(08 Marks)**

4 a. Explain qualitatively preamplification and decision circuits of a CMOS comparator unit. Draw their CMOS circuits. **(10 Marks)**

b. Explain the principle of an analog multiplier. **(05 Marks)**

c. Briefly explain CMOS analog multiplier with the help of a circuit diagram. **(05 Marks)**

PART – B

5 a. Define SNR, effective number of bits and clock jitter in mixed signal circuits qualitatively. **(08 Marks)**

b. Explain the principle of averaging to improve SNR, in mixed signal circuits. **(06 Marks)**

c. Briefly explain the role of decimating filters in ADCs. **(06 Marks)**

6 a. With a neat process flow diagram, explain submicron CMOS technology and bring out the differences as compared to CMOS technology. **(10 Marks)**

b. Explain how capacitor and resister elements are fabricated in submicron technology. **(07 Marks)**

c. Explain MOSFET as a switch. **(03 Marks)**

7 a. What are delay elements? Explain how they are realized using pass transistors, inverters and C^2MOS and TSPC circuits. **(10 Marks)**

b. Realize a 4-bit pipelined adder using latches and explain its operation. **(05 Marks)**

c. Implement full adder using dynamic logic and explain. **(05 Marks)**

8 a. Consider a small signal amplification of a floating current source shown in Fig.Q8(A). Assuming NMOS cascade o/p resistance is labeled R_{ncas}, what is the small signal resistance scan by test voltage V_{test}? **(10 Marks)**

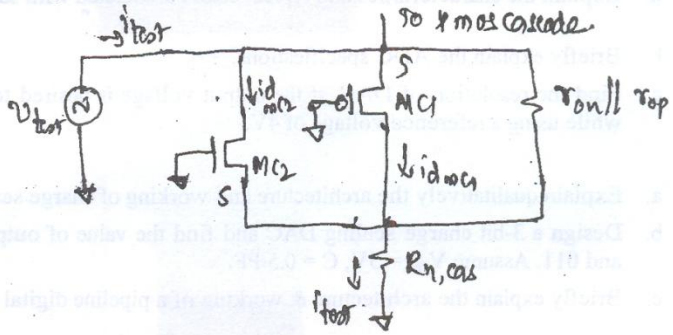

Fig.Q8(A)

b. Explain with the help of circuit diagrams, the technique of making the flow rate concern in the design of op amp. **(10 Marks)**

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06EC65

Sixth Semester B.E. Degree Examination, May/June 2010
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. A binary source is emitting an independent sequence of 0's and 1's with the probabilities P and (1 – P) respectively. Plot the entropy of the source versus probability [0 < P < 1]. Write the conclusion. **(04 Marks)**

b. In a facsimile transmission of picture there are about 3.25×10^6 pixels per frame. For a good reproduction, 15 brightness levels are necessary. Assume all these levels are equally likely to occur. Find the rate of information transmission if one picture is to be transmitted every 3 minutes. **(05 Marks)**

c. The state diagram of the Mark off source is as shown in the Fig.Q1(c). P(state i) = $\frac{1}{3}$ for i = 1, 2, 3. Find : i) the entropy of each state Hi, ii) the entropy of source H, iii) G_1, G_2 and H. **(11 Marks)**

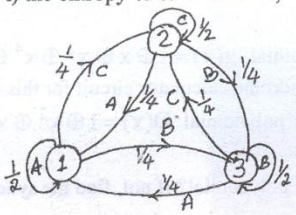

Fig.Q1(c)

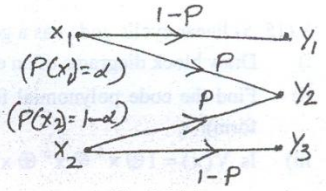

Fig.Q3(b)

2 a. What are the important properties of codes while encoding a source? **(05 Marks)**

b. A source emits an independent sequence of symbols from an alphabet consisting of five symbols A, B, C, D and E with probabilities of $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{5}{16}$ respectively. Find the Shannon code for each symbol and efficiency and redundancy of the coding scheme. **(06 Marks)**

c. For a channel whose matrix is given below for which $P(x_1) = \frac{1}{2}$, $P(x_2) = P(x_3) = \frac{1}{4}$ and r_s = 10000/sec, find H(x), H(y), $H\left(\frac{y}{x}\right)$, H(x, y), I(x, y) and the capacity.

$$P\left[\frac{y}{x}\right] = \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.1 & 0.8 & 0.1 \\ 0 & 0.2 & 0.8 \end{bmatrix}$$

(09 Marks)

3 a. Design a quaternary and binary source code for the source shown, using Huffman's coding scheme.

$S = \{S_1, S_2, S_3, S_4, S_5, S_6, S_7\}$; $P = \left\{\frac{9}{32}, \frac{3}{32}, \frac{3}{32}, \frac{2}{32}, \frac{9}{32}, \frac{3}{32}, \frac{3}{32}\right\}$; $X = \{0, 1, 2, 3\}$ and $X = \|0, 1\|$. Find the coding efficiency. **(12 Marks)**

b. For a binary erasure channel shown in Fig.Q3(b), find the following:

i) Average mutual information
ii) Channel capacity
iii) Values of $P(x_1)$ and $P(x_2)$ for maximum mutual information. **(08 Marks)**

4 a. State and explain Shannon Hartley law. Derive the expression for the upper limit of the channel capacity. **(06 Marks)**

b. A voice grade channel of the telephone network has the bandwidth of 3.4 KHz. Calculate:
i) The channel capacity for a SNR of 30 dB
ii) The minimum SNR required to support information transmission at the rate of 4800 bits/sec. **(06 Marks)**

c. Show that : i) $I(x, y) \geq 0$; ii) $I(x, y) = (y, x)$; iii) $I(x, y) = H(x) + H(y) - H(x, y)$. **(08 Marks)**

PART – B

5 a. Consider the (7, 4) LBC whose generator matrix is given below. Find:
i) All code vectors ii) Parity check matrix, H
iii) The minimum weight and distance of this code.

$$[G] = \begin{bmatrix} 1000 & 101 \\ 0100 & 111 \\ 0010 & 110 \\ 0001 & 011 \end{bmatrix}$$ **(10 Marks)**

b. Prove that $CH^T = 0$. **(04 Marks)**

c. Why do we need error control coding? What are the types of errors and types of coding to combat them? **(06 Marks)**

6 a. A (15, 5) linear cyclic code has a generator polynomial, $g(x) = 1 \oplus x \oplus x^2 \oplus x^4 \oplus x^5 \oplus x^8 \oplus x^{10}$.
i) Draw block diagrams of an encoder and syndrome calculator circuit for this code.
ii) Find the code polynomial for the message polynomial $D(x) = 1 \oplus x^2 \oplus x^4$ (in a systematic form).
iii) Is $V(x) = 1 \oplus x^4 \oplus x^6 \oplus x^8 \oplus x^{14}$ a code polynomial? If not, find the syndrome of V(x). **(12 Marks)**

b. What is a binary cyclic code? Discuss the features of encoder and decoder used for cyclic codes using an (n – k) bit shift register. **(08 Marks)**

7 a. Explain briefly the following: **(09 Marks)**
i) Golay code ii) BCH code
iii) Shortened cyclic code iv) Reed Solomon code.

b. Consider a [15, 9] cyclic code generated by $g(x) = 1 \oplus x^3 \oplus x^4 \oplus x^5 \oplus x^6$. Find the burst error correcting efficiency of this code. **(06 Marks)**

c. List the advantages and disadvantages of cyclic codes. **(05 Marks)**

8 Fig.Q8 below shows the convolutional encoder:

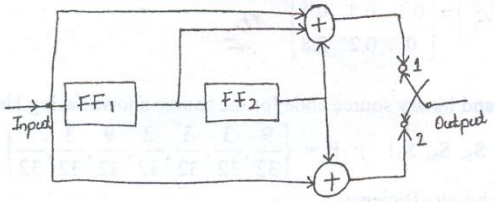

Fig.Q8

a. Write the impulse response of this encoder. **(03 Marks)**

b. Find the output for the message (10011) using time domain approach. **(05 Marks)**

c. Find the output for the message (10011) using transform domain approach. **(05 Marks)**

d. Draw the code tree for the encoder. **(07 Marks)**

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06EC667

Sixth Semester B.E. Degree Examination, May/June 2010
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.***

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.

PART – A

1 a. Briefly explain the VHDL operators. **(07 Marks)**

b. Differentiate between signals and variables. **(05 Marks)**

c. Write a VHDL description for n-bit binary adder, using structural modeling. **(08 Marks)**

2 a. Write a behavioral description of JKFF with active low preset and clear inputs. **(06 Marks)**

b. Differentiate between the functions and procedures. Write a VHDL code to add two 8-bits of data, using a function. **(10 Marks)**

c. Explain packages. **(04 Marks)**

3 a. Differentiate between PAL and PLAs. Implement the following functions, using a suitable PLA:

$F_1(A, B, C, D) = \Sigma\, m(2, 3, 5, 7, 8, 9, 10, 11, 13, 15)$

$F_2(A, B, C, D) = \Sigma\, m(2, 3, 5, 6, 7, 10, 11, 14, 15)$

$F_3(A, B, C, D) = \Sigma\, m(6, 7, 8, 9, 13, 14, 15)$ **(10 Marks)**

b. Write a state graph and VHDL code for the traffic light controller. **(10 Marks)**

4 a. With a neat block diagram, explain the operation of serial adder with accumulator. **(05 Marks)**

b. Write a state graph and VHDL description of a binary divider that divides an 8-bit dividend by 4-bit divisor. **(08 Marks)**

c. Write a behavioral model for signed 4-bit ×4-bit faster multiplier. **(07 Marks)**

PART – B

5 a. Briefly explain the state machine charts. **(06 Marks)**

b. For the dice game based on the following rules, draw the SM chart, state graph and hence develop the behavioral model:

i) After the roll of the dice, the player wins if the sum is 7 or 11. The player loses if the sum is 2, 3 or 12. Otherwise, the sum obtained by the player on the first roll is referred to as a point and he/she must roll the dice again.

ii) On the second or subsequent roll of the dice, the player wins if the sum equals the point and he/she loses if the sum is 7. Otherwise, the player must roll again until he/she finally wins or loses. **(14 Marks)**

6 a. Outline the steps of procedure to design a digital system with FPGA. **(04 Marks)**

b. With XILINX 3000 series, implement a parallel-adder-subtractor, with an accumulator. **(10 Marks)**

c. Explain the architecture of ALTERA 7000 series CPLD. **(06 Marks)**

7 a. Explain the transport and inertial delays, with an example, using waveforms. **(10 Marks)**

b. Briefly explain the synthesis. **(04 Marks)**

c. Explain the resolution of signal drivers. **(06 Marks)**

8 a. Write a behavioral description of RAM 6116. **(06 Marks)**

b. Write a SM chart for simplified 486 bus interface with CPU. **(07 Marks)**

c. Write a VHDL description of floating-point subtractor. **(07 Marks)**

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06EC64

Sixth Semester B.E. Degree Examination, May/June 2010
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Define the following with respect to antenna:
   i) Isotropic radiator
   ii) Directivity
   iii) Radiation pattern
   iv) Polarization. **(10 Marks)**

   b. Antenna of gain G radiates Wt. Watts. Show that the free space intensity E at a distance of r metres is given by $E = \frac{\sqrt{30wt.G}}{r}$ v/m. **(05 Marks)**

   c. Derive an expression for antenna efficiency in terms of radiation resistance. **(05 Marks)**

2 a. Find the directivity and beam width of the following :
   i) $U = U_m \sin\phi \cos^2\theta$ ii) $U = U_m \cos\phi \sin^2\theta$. **(10 Marks)**

   b. State and prove the power theorem. **(05 Marks)**

   c. Prove that $D = 2(n+1)$ for a unidirectional pattern given by $U = U_m \cos^n\theta$. **(05 Marks)**

3 a. Derive an expression for field intensity for two isotropic point sources with equal amplitude and equal phase. **(10 Marks)**

   b. Draw the polar diagram of a broadside array with number of elements = 5 and spacing = $\lambda/2$. **(10 Marks)**

4 a. Derive an expression for radiation resistance of a short electric dipole. **(10 Marks)**

   b. Write short notes on :
   i) Folded dipole antenna ; ii) Thin linear antenna. **(10 Marks)**

PART – B

5 a. Discuss the features of a loop antenna. Derive an expression for far field components of a loop antenna. **(10 Marks)**

   b. Write notes on : i) Horn antenna ; ii) Slot antenna. **(10 Marks)**

6 a. Discuss the features of an helical antenna. Give the construction details of the helical antenna. **(10 Marks)**

   b. What are parabolic reflectors? Where these antennas are used? **(05 Marks)**

   c. Draw the construction details of an embedded antenna. **(05 Marks)**

7 a. Discuss the different forms of radio wave propagation. **(10 Marks)**

   b. Derive an expression for wave tilt of surface wave. **(10 Marks)**

8 a. Explain different layers of ionosphere in detail. **(10 Marks)**

   b. Define the following with respect to wave propagation :
   i) Critical frequency ; ii) MUF ; iii) Virtual height ; iv) Skip distance. **(10 Marks)**

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06TE64

Sixth Semester B.E. Degree Examination, May/June 2010
Transmission Lines and Antennas

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Smith chart usage is permitted.
3. Standard notations are used.

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.

PART – A

1 a. Formulate the differential equations of uniform general transmission lines from fundamentals and find their general solutions in terms of voltage (E) and current (I) in exponential format at any point on the lines. **(10 Marks)**

b. The values of the primary constants of an open – wire line per loop kilometer are R = 10 Ω, L = 3.5 mH C = 0.008 μF and G = 0.75 μ mho. For signal frequency of 1000 Hz, calculate the characteristic impedance Z_o, phase constant γ, attenuation constant α, phase shift constant β, wavelength λ and phase velocity v_p. **(10 Marks)**

2 a. Show that the input impedance of OC and SC loss-less transmission lines are purely reactive, sketch their reactance curves and explain. **(10 Marks)**

b. A transmission line having characteristic impedance of 50 ohms is terminated by a load impedance of 100 – j75 ohms. Find out the standing wave ratio (S) and the reflection coefficient (K) of the line with the help of the smith chart and verify the result by numerical method using equations. **(10 Marks)**

3 a. Derive an expression for the location 'd' and length '*l*' of the single stub so as to effect matching on a transmission line. **(10 Marks)**

b. A line of Ro = 400 Ω is connected to a load of 200 + j300 Ω which is excited by a matched generator at 800 MHz. Find the location and length of a single stub nearest to the load to produce an impedance match, using Smith chart. **(10 Marks)**

4 a. Explain the following terms as related to antenna systems :
i) Radiation intensity
ii) Directivity
iii) Beam area
iv) Half Power Beam Width (HPBW)
v) Beam efficiency. **(10 Marks)**

b. Define aperture of an antenna. Explain five different types of apertures of antenna. Derive equations for each of them and bring out the relation among them. **(10 Marks)**

PART – B

5 a. Derive an expression and draw the field pattern for an array of two isotropic point sources with equal amplitude and opposite phase and with physical separation of λ/2 on the array axis. **(10 Marks)**

b. What is an isotropic point source? A linear uniform array of four isotropic antennas placed in a horizontal axis, producing broad side array, satisfy the following parameters :
No. of sources in the array n = 4.
Phase difference between adjacent sources $\delta = 0$.
Distance between adjacent sources $d = \lambda/2$. Obtain and draw the field pattern and calculate BWFN and HPBW. **(10 Marks)**

6 a. Derive an expression for radiation resistance of a short dipole with uniform current. **(08 Marks)**

b. Calculate the radiation resistances of short dipole of lengths i) $L = \lambda/10$ and ii) $L = \lambda/100$. **(04 Marks)**

c. Derive the far – field expressions for a small loop antenna. **(08 Marks)**

7 a. Explain with examples the different types of rectangular and circular horn antennas. What are their advantages over the other antennas? Derive the design equation for the flare angle of horn antenna. Mention any one application. **(10 Marks)**

b. What is a log – periodic antenna? Why is it called so? Explain its characteristics and applications, with a suitable diagram. **(10 Marks)**

8 Write short notes on the following :
a. Parabolic reflectors
b. Slot antennas
c. Lens antennas
d. Ultra – Wide Band (UWB) antennas. **(20 Marks)**

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06TE63

Sixth Semester B.E. Degree Examination, May/June 2010
Satellite Communication

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. What is meant by diffraction and scintillation in radio wave propagation? Explain their effect in satellite communication. **(08 Marks)**

b. How is it possible to reduce interference due to ground reflected waves in earth stations? **(06 Marks)**

c. Calculate the free space loss between a satellite and an earth station if EM wave is assumed to be exactly in the point to point pencil beam communication and travels a distance of 40,000 km. The carrier frequency is 64 Hz. **(06 Marks)**

2 a. What are the electrical properties of ionosphere? Why polarization rotation occurs in ionosphere? What is its effect at the receiver? **(08 Marks)**

b. What is tropospheric scattering, how does it effect satellite communication? **(04 Marks)**

c. What are window frequencies? Why microwave frequencies are preferred in satellite communication? **(08 Marks)**

3 a. What are Kepler's laws of orbiting body that orbits around a primary body only due to influence of mutual gravitational force between these bodies? Derive an equation to show that Kepler's laws are true for a satellite in geosynchronous orbit. **(08 Marks)**

b. A satellite is orbiting in space around the earth at a radius of 42120 km. Find the velocity and time of orbit. Assume the gravitational coefficient of earth is 3,98,600.5 km^3/sec^2. Is it near geosynchronous? **(08 Marks)**

c. What do you mean by near-geostationary satellites? **(04 Marks)**

4 a. Define the following:
i) Perigee ii) Sun synchronous orbit iii) Satellite eclipse
iv) Sidral day v) Sun outage **(10 Marks)**

b. Show that a geostationary satellite cannot cover areas around the poles of the earth. **(06 Marks)**

c. What do you mean by antenna look angle? Explain. **(04 Marks)**

PART – B

5 a. What are the different losses that a propagating wave suffers while traveling from earth station to satellite and vice-versa? Explain, which of these is prominent and why? **(08 Marks)**

b. It is proposed to setup a link between earth stations 2500 km apart through a geo-stationary satellite. The slant range of first station to satellite is 38000 km and that of second earth station to satellite is 40,000 km. The average atmospheric losses are 5 dB for 99.9% of the time. If the rain attenuation path is 18 km and loss at 14/12 GHz link is 0.5 dB/km, calculate the EIRP required for a minimum power of 12 pw at the receiver. The satellite has an overall gain of 120 dB. The antenna used at the receiver is a 5 m dish with 75% efficiency.
Draw the link setup indicating power at each input and at output in dB, if transmitting antenna gain is 62dB. **(12 Marks)**

6 a. Mention the various sources of noise in satellite systems and explain each one of them briefly. **(08 Marks)**

b. Calculate the noise power and carrier to noise ratio in the receiving system shown in Fig.Q6(b). The received noise power density 'No' is –213.6 W/Hz and carrier power 'C' is –82 dBW. The system has an IF amplifier whose 3 dB bandwidth is 40 MHz. Is the receiver gain sufficient? **(08 Marks)**

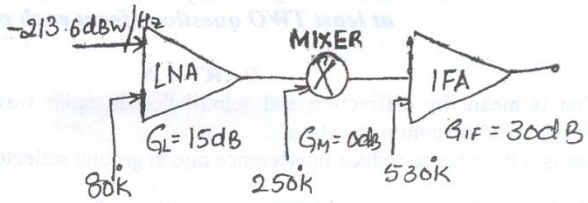

Fig.Q6(b)

Given : K → Boltzman constant = -228.6 dBJ/°K

c. What is an absorptive network? How noise is calculated in such a network? **(04 Marks)**

7 a. What is meant by the terms attitude control and station keeping? Explain how these are achieved. **(08 Marks)**

b. How T T and C helps in keeping the satellite in orbit during launch and during operation from its parking place? Give a typical T T and C arrangement. **(06 Marks)**

c. Explain the following:

i) Input demultiplexer of a satellite

ii) Back-off

iii) Foot print **(06 Marks)**

8 a. Compare the performance of FDMA and TDMA, with respect to synchronization, power requirement and interference. **(06 Marks)**

b. Calculate the frame efficiency and channel capacity of a satellite transport used for voice in 8 bit PCM / TDM / BPSK / TDMA mode, if :

Total frame period is 5 msec and frame length is equivalent to 140000 symbols. There are 18 traffic bursts in the TDMA frame with one reference after every six bursts. The guard intervals between reference and pre-amble are equivalent to 50 symbols and between frames 120 symbols. The preamble is made up of 256 symbols and reference 264 symbols including CDC. Guard time after every traffic burst is 128 symbols. **(06 Marks)**

c. Draw a CATV system that uses a satellite and explain its working. **(08 Marks)**

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06EC661

Sixth Semester B.E. Degree Examination, May/June 2010
Programming in C++

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. What is an object oriented programming? What are the advantages of OOP? **(06 Marks)**

b. What is meant by dynamic binding? How is it useful in OOP? **(04 Marks)**

c. Explain the following terms, with suitable examples:
i) Classes ii) Inheritance iii) Polymorphism
iv) Encapsulation v) Message communication. **(10 Marks)**

2 a. Explain the two ways of type conversion, using a suitable C ++ program. **(08 Marks)**

b. What is a pointer? Explain the difference between a pointer and a reference, with a suitable example. **(05 Marks)**

c. A motorcycle covers a distance of 45 km per liter of petrol consumption. The cost of petrol is Rs.30.00 per liter. Write a program in C++ to calculate the cost of petrol to travel a distance of 120 km. **(07 Marks)**

3 a. Compare and contrast the if-else statement with a conditional operator, using a C++ program. **(07 Marks)**

b. How does using name space standard statement performs? Explain its function and usage, with an example. **(07 Marks)**

c. Write a C++ program to find the sum of digits of a given number (minimum length is 5 digits). **(06 Marks)**

4 a. Write a simple C++ program to accept a string and counts the number of alphabets, digits and special symbols present in a given string. **(06 Marks)**

b. What is an inline function? Write the rules for inline function. Give an example for inline function. **(06 Marks)**

c. Explain the call-by-value and call-by-reference parameter passing methods, with an example of each. **(08 Marks)**

PART – B

5 a. What is an exception handling? What is the need for it? Name the different types of exceptions. **(08 Marks)**

b. Explain the meaning and syntax of a catch block and try block. **(04 Marks)**

c. Write a C++ program to illustrate the process of catching all uncaught exceptions thrown in a try block. **(08 Marks)**

6 a. With a simple C++ program, using a class, explain the terms: object, private, public, class member and friend function. **(10 Marks)**

b. Distinguish between a constructor and a destructor. Develop a program to implement overloaded constructors and show the corresponding output. **(10 Marks)**

7 a. What are new and delete operators? Write a C++ program to allocate memory to three integers. Use new and delete operators for allocating and deallocating memory. Initialize and display values. **(07 Marks)**

b. What is the use of operator overloading? Write a C++ program to add two complex numbers by overloading the operator +. **(08 Marks)**

c. Explain the mechanism of virtual function. **(05 Marks)**

8 a. What is the difference between multiple and multi-level inheritance? **(04 Marks)**

b. Explain what is meant by a class relationship, base class, derived class and protected members, with the help of examples. **(10 Marks)**

c. Combining the concepts of array and class, develop a C++ program to model a stack of computer memory. **(06 Marks)**

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