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10EC/TE61

Sixth Semester B.E. Degree Examination, June/July 2013

Digital Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the sampling theorem for low pass signals and derive the interpolation formula. **(09 Marks)**

b. With a neat block diagram, explain the scheme for signal reconstruction for practical sampling. **(06 Marks)**

c. Let E denote the energy of a strictly band limited signal g(t). Show that E may be expressed interms of the sample values of g(t), taken at the Nyquist rate as, $E = \frac{1}{2w}\sum_{n=-\infty}^{\infty}\left|g\left(\frac{n}{2w}\right)\right|^2$ where w is the highest frequency component of g(t). **(05 Marks)**

2 a. Derive the expression for signal to quantization noise ratio (SNR) and show that for uniform quantization, each bit in the codeword of a PCM contributes 6 dB to SNR. **(08 Marks)**

b. Six independent message sources of bandwidths w, w, 2w, 2w, 3w and 3w hertz are to be transmitted on TDM. Set up a scheme to accomplish this requirement, with each message signal sampled at its Nyquist rate. **(05 Marks)**

c. The signal m(t) = 6 sin ($2\pi t$) Volts, is transmitted using 4-bit binary PCM system. The quantizer is of midriser type with a step size of 1 Volt. The sampling frequency is 4 Hz with samples taken at $t = \pm\frac{1}{8}, \pm\frac{3}{8}, \pm\frac{5}{8}$.... sec. Sketch the PCM wave for one complete cycle of the input. **(07 Marks)**

3 a. With a neat block diagram, explain the delta modulation system and illustrate its quantization error. **(08 Marks)**

b. Derive the expression for power spectral density of NRZ bipolar format. **(07 Marks)**

c. Explain T_1 carrier system with its compounding characteristics. **(05 Marks)**

4 a. Explain the Nyquist criterion for distortionless baseband binary transmission and obtain the ideal solution for zero ISI. **(08 Marks)**

b. For a binary sequence 10110001, construct (i) RZ polar format, (ii) Manchester format. **(04 Marks)**

c. The binary data 011100101 is applied to the input of a modified duobinary system.

i) Construct the modified duobinary coder output and receiver output with a precoder.

ii) Due to transmission error, the level produced by the third digit is zero, construct the new receiver output. **(08 Marks)**

PART – B

5 a. Obtain the expression for probability of symbol error of coherent binary FSK. **(09 Marks)**

b. Compare the probability of symbol errors for basic digital modulation formats and explain how the probability of error depends on the distance between the message points in signal space diagram. **(04 Marks)**

c. With a neat block diagram, explain the differential phase shift keying. Illustrate the generation of differentially encoded sequence for the binary data 1100100010. **(07 Marks)**

6 a. With the conceptualized model of a digital communication system, explain the Gram-Schmidt orthogonalization procedure. **(10 Marks)**

b. Using the Gram-Schmidt orthogonalization procedure, find a set of orthonormal basis functions to represent the three signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ shown in Fig.Q6(b). Express each of these signals in terms of the set of basis functions. **(10 Marks)**

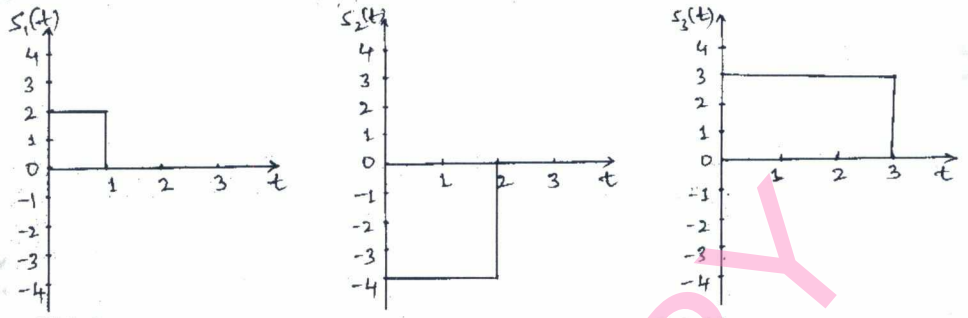


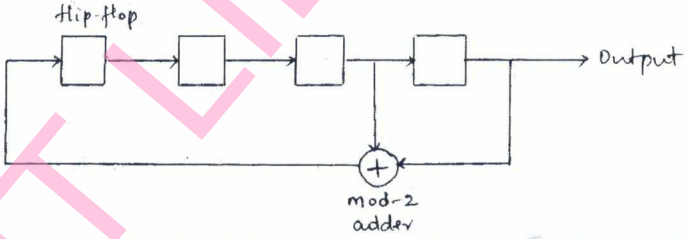
Fig.Q6(b)

7 a. Explain the maximum likelihood detection process and obtain the decision rule. **(10 Marks)**

b. Derive the impulse response of a matched filter receiver and explain any two properties of matched filter. **(10 Marks)**

8 a. Explain frequency hoop spread m-ary frequency shift keying with a neat block diagram and illustrate the slow frequency hopping. **(08 Marks)**

b. Find the output sequence of the shift register shown in Fig.Q8(b). The initial state of the register is 1000. Demonstrate the balance property and run property of a PN sequence. Calculate and plot the autocorrelation function of the PN sequence. **(07 Marks)**



c. In a DS/BPSK system, the feedback shift register used to generate the PN sequence has length m = 19. The system is required to have a probability of error due to externally generated interfering signals that doesn't excess 10^{-5}. Calculate the processing gain and antijam margin in decibels. Use erf(3) = 0.99998. **(05 Marks)**

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10EC/TE62

Sixth Semester B.E. Degree Examination, June/July 2013

Microprocessors

Time: 3 hrs. Max. Marks:100

Note: ***Answer 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 neat diagram, explain the CPU architecture of 8086. **(08 Marks)**

b. Define any four addressing modes used in 8086 microprocessor. Identify addressing modes used in each of the following 8086 instructions:
   i) MOV BX, 0354H
   ii) ADD AL, [BX + 04]
   iii) MOV AX, [BX + SI]
   iv) MOV AX, [BX + SI + 04] **(08 Marks)**

c. If DS = AB40H, CS = 9960H, SS = 3B00H, BP = 7E74H, SP = 0135H, SI = 1245H, DI = 4356H, then determine physical address of the following instructions:
   i) MOV [BP + DI + 6], AH
   ii) ADD AL, [5036H] **(04 Marks)**

2 a. What do you mean by segment override prefix? Give an example. **(04 Marks)**

b. Explain the role of AAD and AAM instruction of 8086 microprocessor with an example. **(06 Marks)**

c. Write an assembly level language program to sort the numbers in ascending order using Bubble sorting technique. The program should be written using assembler Directives. **(10 Marks)**

3 a. What are Assembler Directives? Explain the following directives with an example for each:
   i) ASSUME
   ii) PUBLIC and EXTRN
   iii) GLOBAL
   iv) ALIGN16 **(09 Marks)**

b. Write an ALP to search a given character in the array of characters using string instructions. What is the role of SI, DI registers and DF bit? **(05 Marks)**

c. Write an ALP to read a string from the keyboard and display the reversed string on the monitor screen. **(06 Marks)**

4 a. Define interrupts. Explain TYPE0, TYPE1, TYPE2, TYPE3 and TYPE4 interrupts. **(06 Marks)**

b. Explain hardware interrupts of 8086 microprocessor. **(04 Marks)**

c. Differentiate macros and procedures. **(04 Marks)**

d. Write a macro to read a character without echo and to read a string of characters from the keyboard. **(06 Marks)**

PART – B

5 a. Define Stepper motor. Explain the interfacing of a stepper motor to 8086 microprocessor with necessary circuit diagram. Write an ALP to rotate the stepper motor clockwise by n steps and anticlockwise by m steps. **(10 Marks)**

b. Interface 4 × 4 keyboard to 8086 microprocessor using 8255. Write the necessary circuit diagram and an ALP. **(10 Marks)**

6 a. What are the functions of following 8087 instructions? Explain.
   i) FCOMP
   ii) FENI
   iii) FDECSTP
   iv) FSTENV
   v) FYL2XP1 **(10 Marks)**

   b. Write a program using 8087 instructions to compute the volume of the sphere using MASM syntax. **(06 Marks)**

   c. Explain the control register format of 8087. **(04 Marks)**

7 a. With a neat diagram, explain the maximum mode operation of 8086. **(08 Marks)**

   b. What are the characteristics of PCI and USB interface? **(06 Marks)**

   c. Interface Printer 8086 processor with relevant signals of importance. Explain using a flowchart. **(06 Marks)**

8 Write short notes for the following:

   a. 80386 special registers **(06 Marks)**

   b. Salient features of 80486 processor **(06 Marks)**

   c. Pentium CPU architecture **(08 Marks)**

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10EC63

Sixth Semester B.E. Degree Examination, June/July 2013
Microelectronic Circuits

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least THREE from Part A and TWO from Part B.***

PART – A

1 a. Derive the equation for finite output resistance of a MOSFET. **(08 Marks)**

b. For the CS-amplifier shown in Fig.Q.1(b), find R_{in}, Av_o, R_{out} and Gv with r_o taken into account. If V_{sig} is a 0.4V (P-P) what output signal results? Assume R_{sig} = 10KΩ, R_L = 15KΩ, g_m = 1 mA/v and r_o = 150KΩ. **(08 Marks)**

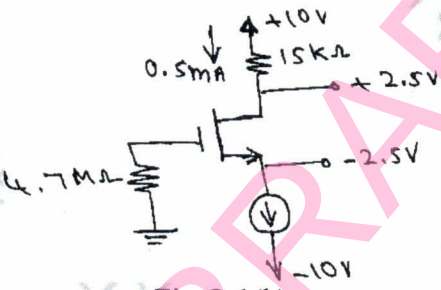

Fig.Q.1(b)

c. What is threshold voltage and mention its range? **(04 Marks)**

2 a. Draw the development of the T-equivalent circuit model for the MOSFET. **(05 Marks)**

b. Derive the voltage gain and overall voltage equations of a source follower using MOSFET. **(08 Marks)**

c. Design the circuit shown in Fig.Q.2(c) so that the transistor operates at I_D = 0.4 mA and V_D = 0.5V. The NMOS transistor has V_t = 0.7V, $\mu_n C_{ox}$ = 100 μ A/V^2, L = 1μm and W = 32 μm. Neglect the channel length modulation effect. **(07 Marks)**

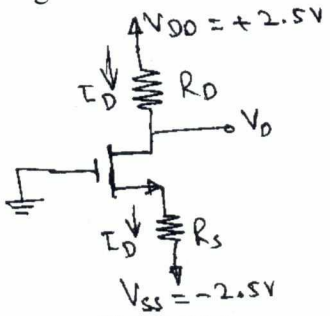

Fig.Q.2(c)

3 a. What is MOSFET scaling? Mention the benefits of scaling. **(06 Marks)**

b. Draw the MOSFET constant current source circuit and explain it. **(06 Marks)**

c. Explain the operation of a MOS current steering circuit and mention it advantage. **(08 Marks)**

4 a. What is cascade amplifier? Explain the operation of a MOS cascade amplifier. **(07 Marks)**

b. Draw the high frequency-equivalent circuit model of the MOSFET common source amplifier and explain the significance of each element. **(07 Marks)**

c. Draw the three different transistor pairings and explain each configuration. **(06 Marks)**

5 a. Explain the operation of MOS differential pair with a differential input voltage. **(07 Marks)**
b. Draw the circuit diagram of a active-loaded MOS differential pair and explain it. **(08 Marks)**
c. What are the features of two-stage CMOS op-amp configuration? **(05 Marks)**

PART – B

6 a. Explain the effect of feedback on the amplifier poles. **(06 Marks)**
b. What are the properties of negative feedbacks? Explain in detail. **(08 Marks)**
c. Draw the ideal structure for the series-series feedback amplifier and explain it. **(06 Marks)**

7 a. Explain how to minimize the temperature effect in a logarithmic amplifier. **(08 Marks)**
b. Draw the sample and hold circuit using op-amp and explain it. **(07 Marks)**
c. Design a non-inverting op-amp with a gain of 2. At the maximum output voltage of 10V and the current in the voltage divider is to be 10μA. **(05 Marks)**

8 a. What are the reasons for choosing CMOS over bipolar technology in digital applications? **(04 Marks)**
b. Explain the dynamic operation of a CMOS inverter. **(10 Marks)**
c. Implement $F = \overline{AB + CD}$ using the AOI gate. **(06 Marks)**

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10EC64

Sixth Semester B.E. Degree Examination, June/July 2013

Antennas and Propagation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following terms with respect to antenna:
i) Directivity ii) Beam solid angle iii) Radiation resistance **(09 Marks)**

b. State and prove Frii's transmission formula. **(05 Marks)**

c. Show that maximum effective aperture of short dipole is $0.119\lambda^2$. **(06 Marks)**

2 a. State and prove power theorem and its application. **(05 Marks)**

b. Show that the directivity for unidirectional operation is $2(n + 1)$ for an intensity variation of $U = U_m \cos^n \theta$. **(05 Marks)**

c. Derive an expression and draw the field pattern for isotropic point sources of the same amplitude and same phase. **(10 Marks)**

3 a. Starting from electric and magnetic potentials, obtain the far field components for a short dipole. **(12 Marks)**

b. Derive an expression for radiation resistance of a short electric dipole. **(08 Marks)**

4 a. Derive an expression for far field components of a loop antenna. **(10 Marks)**

b. The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give a radiation resistance of 35 Ω. **(05 Marks)**

c. Write a note on slot antenna. **(05 Marks)**

PART – B

5 a. Explain the features of an helical antenna and the practical design considerations of the helical antenna. **(10 Marks)**

b. Write note on: i) Ultra wide band antenna, ii) Lens antenna. **(10 Marks)**

6 a. Explain: i) Yagi-Uda antenna, ii) Parabolic reflectors. **(10 Marks)**

b. Write short notes on:
i) Turnstile antenna ii) Antennas for ground penetrating radar. **(10 Marks)**

7 a. Discuss the propagation characteristics of radio waves for different frequencies. **(10 Marks)**

b. Explain the principle of surface wave propagation. Obtain an equation for tilt angle α of the wave. **(10 Marks)**

8 a. Draw and explain different ionized layers an ionospheric propagation. **(10 Marks)**

b. A distance of 1500 km one is to be covered along earth surface using a communication link of the reflection region of ionosphere has f_c 6 MHz and f_{MUF} 7.5 MHz, calculate the height of the region. **(05 Marks)**

c. Write a note on skip distance. **(05 Marks)**

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10EC65

Sixth Semester B.E. Degree Examination, June/July 2013
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the two goals of an operating system (OS)? Explain briefly. **(04 Marks)**

b. Describe the batch processing system and functions of scheduling and memory management for the same. **(08 Marks)**

c. Why I/O bound programs should be given higher priorities in a multiprogramming environment? Illustrate with timing diagram. **(08 Marks)**

2 a. Explain system generation operations. **(04 Marks)**

b. Compare Kernel based and microkernel based OS function. **(08 Marks)**

c. Explain layered OS structure. How is it superior compared to monolithic structure? **(08 Marks)**

3 a. Mention the three kinds of entities used for concurrency within a process in threads in Solaris, along with a diagram. **(04 Marks)**

b. With a state transition diagram and PCB structure, explain the function of the states, state transitions and the functions of a schedule. **(08 Marks)**

c. Explain the race condition in airline reservation system with an algorithm. **(08 Marks)**

4 a. Compare static and dynamic memory allocation. What are the four program components for which the memory is to be allocated? **(04 Marks)**

b. Describe: i) Best fit technique for free space allocation and ii) Variable partitioned allocation with their merits and demerits. **(08 Marks)**

c. Describe buddy system allocator for program controlled data. How does it differ from process-of-two allocator? **(08 Marks)**

PART – B

5 a. Explain "page out daemon" for handling virtual memory in UNIX OS. **(04 Marks)**

b. Describe the address translation using ATU and TLB in demand paged allocation with a block diagram. **(08 Marks)**

c. Determine the number of page faults in FIFO and LRU policies for the following page reference string. Pages: 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1. Assume that there are 3 page frames and all are initially empty and the first page loaded causes a page fault. Also compare these two techniques. **(08 Marks)**

6 a. Compare sequential and direct file organization. **(04 Marks)**

b. Describe the interface between file system and IOCS. **(08 Marks)**

c. Explain the file system actions when a file is opened and a file is closed. **(08 Marks)**

7 a. What are the functions of medium and short term schedulers? **(04 Marks)**

b. Determine mean turn around time for SJN an RR scheduling, assuming a time slice of 1 second for the following table:

Process	Arrival time in seconds	Execution time in seconds	Deadline in seconds
P_1	0	3	4
P_2	2	3	14
P_3	3	2	6
P_4	5	5	11
P_5	8	3	12

(08 Marks)

c. Describe the various blocks in a long term scheduling with JCB structure. **(08 Marks)**

8 a. Explain the primitives used for the transmission and reception of messages in an OS. **(04 Marks)**

b. Describe message delivery protocols and the exceptional conditions during message delivery with an example. **(08 Marks)**

c. Explain the interprocess communication mechanisms in UNIX OS. **(08 Marks)**

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10EC662

Sixth Semester B.E. Degree Examination, June/July 2013
Satellite Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is satellite communication? List some of the services provided by satellite communication. **(06 Marks)**

b. Explain frequency allocations for a satellite services. **(04 Marks)**

c. State and explain the Kepler's law of planetary motion with neat diagrams and necessary equations. **(10 Marks)**

2 a. Define and explain the following terms applied to satellites in orbit:
i) Apogee and perigee points.
ii) Ascending and descending nodes.
iii) Prograde and retrograde orbits. **(10 Marks)**

b. An earth orbsting satellite, has an eccentricity of 0.15 and semimajor axis of 9000 kms. Determine: i) Apogee height; ii) Perigee height; iii) Its periodic time. Given $\mu = 3.986 \times 10^5$ km^3/S^2 and assume a mean value of 6371 kms for earth's radius. **(06 Marks)**

c. What are look angles? How they are determined? **(04 Marks)**

3 a. Explain atmospheric and ionospheric losses in satellite communication. **(06 Marks)**

b. A receiver operating at 2800 MHz is shown in block diagram form in Fig.Q.3(b). Calculate its (G/T) ratio in dB/K referred to the output port of the antenna. **(08 Marks)**

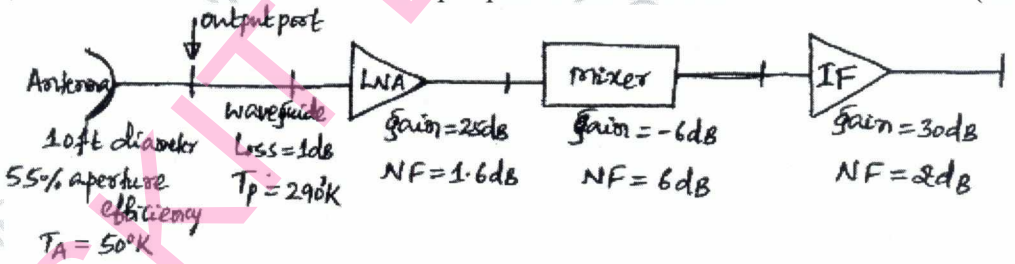

Fig.Q.3(b)

c. Calculate rain attenuation for a frequency of 12GHz for circular polarization. The rain rate of 10mm/h is exceeded for 0.01 percent of the year. The earth station attitude is 600 meters, and an antenna elevation angle is 50°. The rain height is 3 kms. [ah = 0.0188, $b_h = 1.217$, $a_v = 0.168$, $b_v = 1.2$]. **(06 Marks)**

4 a. Explain the functions of the following satellite subsystems:
i) Transponder.
ii) Power system.
iii) Wide band receiver.
iv) Telemetry, tracking and command system. **(08 Marks)**

b. What is meant by satellite altitude? With the help of neat diagram, explain two types of altitude control. **(12 Marks)**

PART – B

5 a. With the help of block diagram, explain the working of master antenna TV system. Compare CATV and MATV system. **(10 Marks)**

b. With the aid of a block diagram, explain the indoor and outdoor units of a receive only home TV system. **(10 Marks)**

6 a. Explain the concepts of TDMA and FDMA using appropriate figures. Discuss the relative advantages and disadvantages of each. **(10 Marks)**

b. The carrier-to-interference ratio at the ground receiving antenna is 23.3 dB. For the uplink [C/I] ratio is 27.53 dB. Find the overall ratio $[C/I]_{ant}$ for $(I/C)_U = 0.001766$ and $(I/C)_D = 0.004436$. **(06 Marks)**

c. What are the different interferences that occur in FDMA system? **(04 Marks)**

7 a. Explain in brief different types of satellite mobile services. **(10 Marks)**

b. Explain the following:

i) Transponder capacity.

ii) Frequency and polarization.

iii) Bit-rate and digital TV. **(10 Marks)**

8 Write notes on:

a. GPS and its uses.

b. Iridium.

c. Antenna look angles.

d. VSAT and its applications. **(20 Marks)**

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