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10EC/TE61

Sixth Semester B.E. Degree Examination, June/July 2016

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 sampling theorem of low pass signals and derive the interpolation formula. **(08 Marks)**

b. A low pass signal x(t) has spectrum X(f) given by,

$$X(f) = \begin{cases} 1 - \frac{|f|}{200}; & |f| < 200 \\ 0 & \text{Elsewhere} \end{cases}$$

Sketch the spectrum $X_\delta(f)$ for $|f| < 200$ Hz if x(t) is ideally sampled at $f_s = 300$ Hz. **(06 Marks)**

c. A band pass signal g(t) with a spectrum shown in Fig.Q1(c) is ideally sampled. Sketch the spectrum of sampled signal at $f_s = 25$ Hz and $f_s = 45$ Hz. Indicate if and how the signal can be recovered.

Fig.Q1(c) **(06 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. For a binary PCM signal, determine L if the compression parameter $\mu = 100$ and the minimum $[SNR]_0$ dB = 45 dB. Determine the $[SNR]_0$ dB with this value of L. **(06 Marks)**

c. With a neat block diagram and waveform, explain time division multiplexing. **(06 Marks)**

3 a. Explain the principles of delta modulator. With relevant figure and mathematical expressions, explain the functioning of DM transmitter and receiver. **(08 Marks)**

b. For a binary sequence 111000110101 draw the digital format waveforms corresponding to:
i) Bipolar NRZ waveform and ii) 8-ary signaling waveform. **(06 Marks)**

c. Derive an expression for power spectral density of bipolar NRZ format and plot the same with respect to frequency. **(06 Marks)**

4 a. What is correlative coding? Explain duo binary coding with and without precoding. **(08 Marks)**

b. The binary data 011100101 are applied to the input of a modified duo binary system:
i) Construct the modified duo binary coder output and corresponding receiver output without a precoder.
ii) Suppose that due to error in transmission, the level produced by the third digit is reduced to zero. Construct a new receiver output. **(07 Marks)**

c. With a neat block diagram, explain the concept of adaptive equalization. **(05 Marks)**

PART – B

5 a. With neat block diagram, explain DPSK transmitter and receiver. Illustrate the generation of differentially encoded sequence for the binary input sequence 00100110011110. **(12 Marks)**

b. A binary data is transmitted over an AWGN channel using binary phase shift keying at the rate of 1 Mbps. It is desired to have average probability of error $P_e \leq 10^{-4}$. Noise power spectral density is $N_{0/2} = 10^{-12}$ W/Hz. Determine the average carrier power required at the receiver input, if the detector is of coherent type. Take erfc(3.5) = 0.00025. **(08 Marks)**

6 a. Write a note on Gram-Schmidt orthogonalization procedure. **(08 Marks)**

b. Consider the signal $s_1(t)$, $s_2(t)$, $s_3(t)$ and $s_4(t)$ as given below in Fig.Q6(b).

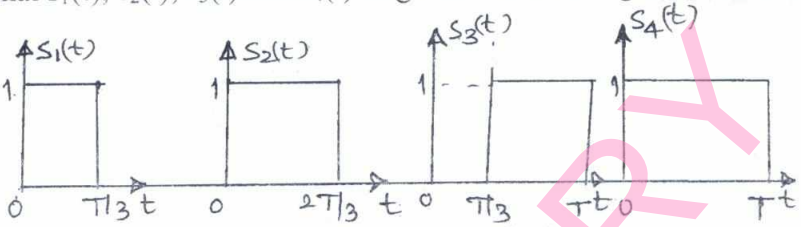

Fig.Q6(b)

Find an orthonormal basis for these set of signals using Gram-Schmidt orthogonalization procedure. **(12 Marks)**

7 a. Draw and explain the block diagram of correlation receiver. **(08 Marks)**

b. Show that the probability of bit error of a matched filter receiver is given by $P_e = \frac{1}{2}\text{erfc}\sqrt{\frac{E_b}{N_o}}$. **(12 Marks)**

8 a. What is spread spectrum technique? How are they classified? **(08 Marks)**

b. Explain properties of PN sequence. **(06 Marks)**

c. A slow FH/MFSK system has the following parameters:
The number of bits/MFSK symbol = 4
The number of MFSK symbols per hop = 6
Calculate processing gain of the system. **(06 Marks)**

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10EC/TE62

Sixth Semester B.E. Degree Examination, June/July 2016
Microprocessors

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With a neat diagram explain the internal architecture of 8086. **(08 Marks)**
b. Explain about segment registers and its advantages. **(06 Marks)**
c. Explain about instruction execution time dependency parameters. **(06 Marks)**

2 a. Explain the following instruction function with an example:
(i) LOOP (ii) IMUL (iii) XLAT (iv) AAM **(06 Marks)**
b. What is assembler directive? Explain the following assembler directives:
(i) ASSUME (ii) PUBLIC (iii) ALIGN **(08 Marks)**
c. Write an ALP to perform GCD of two 16-bit integers and comments. **(06 Marks)**

3 a. Write an ALP to perform reversing string along with flow chart. **(08 Marks)**
b. List out two differences between MACRO and PROCEDURE. **(06 Marks)**
c. List and briefly explain String instruction. **(06 Marks)**

4 a. What is interrupt? Explain about dedicated interrupts with respect to 8086. **(08 Marks)**
b. Briefly explain about hardware and software interrupt applications. **(06 Marks)**
c. What are the steps involve during the interrupt response. **(06 Marks)**

PART – B

5 a. What is interfacing? Explain about $m \times n$ matrix keyboard interface diagram along with program and flow chart. **(14 Marks)**
b. Briefly explain about 8255 control word format. **(06 Marks)**

6 a. Explain about control register of 8087. **(06 Marks)**
b. Explain about various data types with respect to 8087. **(06 Marks)**
c. What is co-processor? Why it is called so? Give the significance of 8087 NDP. **(08 Marks)**

7 a. Explain maximum mode operation of 8086 with relevant block diagram. **(10 Marks)**
b. Write a short note on PCI and USB. **(10 Marks)**

8 a. Write the salient features of 80486. **(06 Marks)**
b. Briefly explain about 80386 special registers. **(10 Marks)**
c. Write a note on Pentium processor. **(04 Marks)**

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10EC63

Sixth Semester B.E. Degree Examination, June/July 2016
Microelectronic Circuits

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting any Three from Part–A and Two from Part–B.*

PART – A

1 a. Derive the expression of $i_D - V_{DS}$ relationship for triode and saturation region of a NMOS transistor. **(10 Marks)**

b. For the MOSFET with $\frac{W}{L} = \frac{8\,\mu m}{0.8\,\mu m}$, calculate the values of V_{GS} and $V_{DS}(min)$ needed to operate the transistor in the saturation region with a dc current I_D = 100. Assume K'_n =194 $\mu A/V^2$ and V_t = 0.7 V. **(05 Marks)**

c. Write the expression for the relationship between V_{SB} and V_t. Mention the effect of V_{SB} on the channel. **(05 Marks)**

2 a. What are the benefits of short channel MOSFETs? **(06 Marks)**

b. Explain the operation of a MOSFET current mirror. **(06 Marks)**

c. Draw the circuit of a MOS current steering circuit and explain it. **(08 Marks)**

3 a. Explain CMOS implementation of the common source amplifier and also draw its i-v characteristic of the active load and transfer characteristic. **(10 Marks)**

b. Consider a common gate amplifier specified as follows :
$\frac{W}{L} = \frac{7.2\mu m}{0.36\mu m}$. $\mu_n C_{OX} = 387\,\mu A/V^2$, $\gamma_0 = 18$ KΩ, I_D = 100 μA, $g_m = 1.25$ mA/V, $\chi = 0.2$, R_S = 10 KΩ, R_L = 100 KΩ, C_{gs} = 20 fF, C_{gd} = 5 fF and C_L = 0. Find A_{VO}, R_{in}, R_{out}, G_V, G_{is}, G_i and f_H. **(10 Marks)**

4 a. What is cascade amplifier? Mention the basic idea behind it. **(04 Marks)**

b. Derive the expression of voltage gain and open circuit voltage gain of a IC-source follower. Draw its small signal equivalent circuit model. **(08 Marks)**

c. Explain the operation of a MOS differential pair with common-mode input voltage. **(08 Marks)**

5 a. Explain the operation of a two-stage CMOS op-amp configuration. Mention its features. **(10 Marks)**

b. Illustrate the method of differential to single-ended conversion. **(07 Marks)**

c. What are the factors contribute to the dc offset voltage of the MOS differential pair? **(03 Marks)**

PART – B

6 a. Discuss the properties of negative feedback in details. **(08 Marks)**

b. Explain the relationship between stability and pole location of an amplifier with effects. **(06 Marks)**

c. Draw the block diagram, representation of a series-shunt feedback amplifier and derive the expression of input resistance with feedback. **(06 Marks)**

7 a. Design a non-inverting amplifier with a gain of 2. At the maximum output voltage of 10 V and the current in the voltage divider is to be 10 μA. **(05 Marks)**

b. With a mathematical analysis and circuits, explain the temperature effects in Logarithmic amplifier are to be minimized. **(09 Marks)**

c. Draw the sample and hold circuit using op-amp and explain it. **(06 Marks)**

8 a. Define the following parameters of a logic circuit family and write the expressions :
i) Propagation delay.
ii) Robustness
iii) Delay-power product.
iv) Dynamic power dissipation. **(08 Marks)**

b. Implement :
i) $F = \overline{AB + CD}$ using the AND-OR-INVERT gate logic.
ii) $F = \overline{(A + B)(C + D)}$ using the OR-AND-INVERT gate logic. **(12 Marks)**

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10EC64

Sixth Semester B.E. Degree Examination, June/July 2016

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. Explain the following terms as related to antenna systems:
i) Beam area ii) Directivity iii) Power gain
iv) Effective aperture v) Radiation resistance **(10 Marks)**

b. Find the directivity of the power pattern given by $U = U_m \sin^2\theta \sin^3\phi$; $0 \le \theta \le \pi$; $0 \le \phi \le \pi$. **(05 Marks)**

c. An antenna has a field pattern given by $E(\theta) = \cos\theta \cos 2\theta$ for $0 \le \theta \le 90^\circ$. Find half power beam width (HPBW) and beam width between first nulls (BWFN). **(05 Marks)**

2 a. Derive an expression for array factor and relative field of linear array of 'n' isotropic point sources of equal magnitude and spacing. **(08 Marks)**

b. Complete the field patterns and find BWFN and HPBW for an array of 4 point sources spaced $\lambda/6$ distance apart. They have a phase difference of $\pi/3$ between adjacent elements. **(06 Marks)**

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

3 a. Derive the far field components of short dipole. **(07 Marks)**

b. For a short dipole of $\lambda/15$ long and loss resistance of 1Ω. Find:
i) Efficiency
ii) Radiation resistance
iii) Effective aperture **(06 Marks)**

c. Write short notes on:
i) V-antennas
ii) Folded dipole antennas
iii) Rhombic antenna **(07 Marks)**

4 a. Derive the far field expressions for small loop antenna. **(07 Marks)**

b. Explain patch or microstrip antennas with necessary sketch. **(06 Marks)**

c. With relevant sketches, explain the principle of Babinet's principle for complementary linear antennas. **(07 Marks)**

PART – B

5 a. Explain the practical design considerations for the axial mode helical antennas. **(10 Marks)**

b. Write short notes on:
i) Yagi-Uda antenna
ii) Corner reflector antenna **(10 Marks)**

6 a. Explain the constructional details of Sleeve antenna and Turnstile antenna. **(08 Marks)**

b. Write short notes on:

i) Embedded antennas

ii) Ultra wideband antennas

iii) Plasma antennas **(12 Marks)**

7 a. Derive an expression for wave tilt of surface wave. **(08 Marks)**

b. Explain duct propagation in detail. **(06 Marks)**

c. Estimate the wave tilt in degrees of the surface wave over an earth of 5 millimhos conductivity and relative permittivity of 10 at 1 MHz. **(06 Marks)**

8 a. Derive an expression for refractive index of an ionospheric propagation. **(06 Marks)**

b. A high frequency link is established for a range of 2000 km. If the reflection region of ionosphere is at a height of 200 km and has a critical frequency of 6 MHz, calculate maximum usable frequency (MUF). **(06 Marks)**

c. Define the following terms related to ionospheric propagation:

i) MUF

ii) Critical frequency

iii) Virtual height

iv) Skip distance **(08 Marks)**

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10EC65

Sixth Semester B.E. Degree Examination, June/July 2016
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. Define OS. What are the common tasks performed by an operating system? **(08 Marks)**

b. Explain briefly, the different classes of operating system, with primary concern and key concepts. **(08 Marks)**

c. What are the operations performed by Kernel when an interrupt occurs? **(04 Marks)**

2 a. Explain : (i) Monolithic OS and (ii) Microkernal OS
Specifying advantages and dis-advantages in each case. **(08 Marks)**

b. Define the following with respect to an operating system:
(i) Policies and mechanisms. (ii) Portability and Extensibility **(08 Marks)**

c. Briefly explain the concept of VMOS, with an example. **(04 Marks)**

3 a. Briefly explain four kinds of process interaction. **(06 Marks)**

b. With state transition diagram, explain the state transition for a process. **(06 Marks)**

c. What are the advantages of threads? Explain briefly Kernel-level and user-level threads, specifying advantages and disadvantages. **(08 Marks)**

4 a. Explain Kernel memory allocator methods. **(10 Marks)**

b. What are the key features in static and dynamic memory allocation? **(06 Marks)**

c. Explain briefly memory compaction with an example. **(04 Marks)**

PART – B

5 a. With reference to virtual memory, explain the following:
(i) Demand paging (ii) Page replacement policies. **(10 Marks)**

b. Explain UNIX virtual memory. **(10 Marks)**

6 a. Explain file operations performed by processes. **(08 Marks)**

b. What are the facilities provided by file-system and IOCS? Write the layered architecture of the system. **(06 Marks)**

c. Explain (i) Sequential file organization (ii) Direct file access organization. **(06 Marks)**

7 a. Define Turn-around-time. Compare average Turn-Around-Time, for the following set of process for FCFS and SRN scheduling. **(08 Marks)**

Process	P_1	P_2	P_3	P_4	P_5
Arrival time	0	2	3	5	9
Service time	3	3	2	5	3

b. Briefly explain process scheduling methods for real time applications. **(06 Marks)**

c. Explain briefly, scheduling in UNIX. **(06 Marks)**

8 a. How interprocess communication is achieved through mail-box? What are its advantages? **(08 Marks)**

b. Explain the following:
(i) Synchronous and asynchronous message passing.
(ii) Data – access synchronization.
(iii) Control synchronization. **(12 Marks)**

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10EC662

Sixth Semester B.E. Degree Examination, June/July 2016
Satellite Communications

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain briefly about various satellite communication services. **(06 Marks)**

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

c. Explain frequency band allocations as per ITU. **(04 Marks)**

2 a. What are the orbit perturbations that take place because of non spherical nature of earth? **(10 Marks)**

b. Explain in detail the earth eclipse of satellite and sun transit outage. **(06 Marks)**

c. What is side real time? **(04 Marks)**

3 a. Explain what is meant by EIRP? A satellite down link at 12GHz operates with a transmit power of 6W and an antenna gain of 48.2 db calculate the EIRP in dbW. **(06 Marks)**

b. Calculate horizontal, vertical and circular polarizations for a frequency of 12GHz. The rain attenuation is exceeded for 0.01% of the time in any year, for a point rain rate of 10mm/hr. The earth station attitude is 600 meters and the antenna elevation angle is 50°. The rain height is 3km and $a_n = 0.0188$ $b_n = 1.217$ $a_v = 0.168$ $b_v = 1.2$. **(10 Marks)**

c. List four different transmission losses in a satellite link. **(04 Marks)**

4 a. What is a satellite transponder? With a neat block diagram explain the overall frequency arrangement of typical C band communication satellite. **(10 Marks)**

b. What are different types of satellite antennas? Explain briefly all of them. **(06 Marks)**

c. What are the major sub systems of a communication satellite? Explain its functions. **(04 Marks)**

PART – B

5 a. What is master antenna TV system? With the hap of a diagram describe an arrangement for MATV system. **(10 Marks)**

b. With a neat block diagram, Explain outdoor and the indoor unit for analog FM/TV. **(10 Marks)**

6 a. Describe briefly the modes of interference that can occur in satellite communication system. Distinguish between satellite and terrestrial mode of interference. **(10 Marks)**

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

c. Explain briefly different types of satellite access? **(04 Marks)**

7 a. Give the applications of Radarsat. Explain a "Dawn to Dusk" orbit. **(08 Marks)**

b. Explain frequency and polarization of direct broadcast satellite service. **(08 Marks)**

c. Explain bit rates of digital television. **(04 Marks)**

8 a. Calculate the bit rates that can be carried in the 24MHz channels using QPSK, allowing a roll off factor of 0.2. **(06 Marks)**

b. Describe the main features iridium system in detail with diagram and application. **(10 Marks)**

c. What are the applications of VSAT? **(04 Marks)**

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10EC665

Sixth Semester B.E. Degree Examination, June/July 2016
Programming in C++

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain with example preprocessor directive available in C++. **(08 Marks)**

b. Explain dynamic memory allocation. What is the difference between static and dynamic memory allocation. **(07 Marks)**

c. Explain object-oriented design and object based design. Give example. **(05 Marks)**

2 a. What is a literal constant? Explain with example. **(06 Marks)**

b. What are the difference between a reference and a pointer? Give advantages of pointer. **(08 Marks)**

c. Distinguish between L-value and R-value. Give example for each. **(06 Marks)**

3 a. Discuss the following with example: i) Unary operators; ii) The Bitwise operator. **(06 Marks)**

b. Explain the switch statement with syntax. Write a program in C++ to find the roots of quadratic equation $ax^2 + bx + c = 0$ use switch. **(10 Marks)**

c. With flowchart, explain i) For ii) While. **(04 Marks)**

4 a. Explain call by value and call by reference parameter method with an example of each. **(08 Marks)**

b. What is an inline function? Explain with example. **(04 Marks)**

c. Write a program to find the maximum number in an array use max ( ) function to implement. **(08 Marks)**

PART – B

5 a. What is an exception handling? Name the different types of exception and explain the exception handling mechanism. **(10 Marks)**

b. Explain the different throwing mechanism. Write a program to realize the expression and handle the exception $R = \frac{z}{y - x}$. **(10 Marks)**

6 a. With simple C++ program, using class, explain the term, object, private, public, constructor and destructor. **(10 Marks)**

b. Write a C++ program to define a class 'stack' including member function push ( ) and pop ( ) and appropriate data members to perform the stack operation. **(10 Marks)**

7 a. What is operator overloading? Write a C++ program to add two complex members by overloading the operator +. **(10 Marks)**

b. What are new and delete operator? Explain overloaded operator new and delete with example. **(10 Marks)**

8 a. What is inheritance? Discuss the different types of inheritance. **(10 Marks)**

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

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