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10EC/TE61

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. State and prove sampling theorem for low pass signals assuming train of impulses for sampling. **(08 Marks)**

b. Explain the principle of quadrature sampling of band pass signals. **(06 Marks)**

c. The signal $g(t) = 4\cos(4\pi t)(\cos 400\pi t)$ is sampled at the rate of 500 samples per second:
i) Determine the spectrum of the resulting sampled signal.
ii) What is Nyquist rate for g(t)?
iii) What is cut off frequency of ideal reconstruction filter? **(06 Marks)**

2 a. With a suitable block diagram, explain the functioning of PCM system. **(10 Marks)**

b. Three independent message source of bandwidths 1 kHz, 1 kHz and 2 kHz respectively are to be transmitted using TDM scheme. Determine
i) The commutator segment arrangement.
ii) The speed of commutator if each signal is sampled at its Nyquist rate.
iii) Minimum transmission bandwidth. **(05 Marks)**

c. The bandwidth of signal input to PCM is restricted to 4 kHz. The input varies from −3.8 to 3.8 V and has average power of 30 mW. The required signal to noise ratio is 20 dB. The modulator produces binary output. Assume uniform quantization
i) Calculate the number of bits required per sample.
ii) Output of 30 such PCM coders are time multiplexed. What is the minimum required transmission bandwidth for multiplexed signal? **(05 Marks)**

3 a. With neat diagram, explain the operation of DPCM. **(06 Marks)**

b. Derive the expression for output signal to quantization noise ratio of a delta modulator. **(10 Marks)**

c. Assume a speech signal with a minimum frequency of 3.4 kHz and a maximum amplitude of 1 V. The speech signal is applied to a delta modulator with its bit rate at 25 kbps. Discuss the choise of an appropriate step size for a delta modulator. **(04 Marks)**

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

b. A binary data sequence is 10110100. Sketch the waveforms for the following formats:
(i) Unipolar NRZ (ii) Unipolar RZ (iii) Polar NRZ (iv) Polar RZ
(v) Manchester coding (vi) Bipolar NRZ. **(06 Marks)**

c. With a neat structure explain concept of adaptive equalization process. **(08 Marks)**

PART – B

5 a. Show that probability of symbol error for frequency shift keying is $P_e = \frac{1}{2}\text{erfc}\left(\sqrt{\frac{\varepsilon_b}{2N_0}}\right)$. **(12 Marks)**

b. With a block diagram of QPSK transmitter and receiver explain generation and demodulation of a QPSK wave. **(08 Marks)**

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

b. Three signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ are as shown. Apply Gram-Schmidt procedure to obtain an orthonormal basis for the signals. Express the signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ in terms of orthonormal basis functions. Also give the signal constellation diagram. **(12 Marks)**

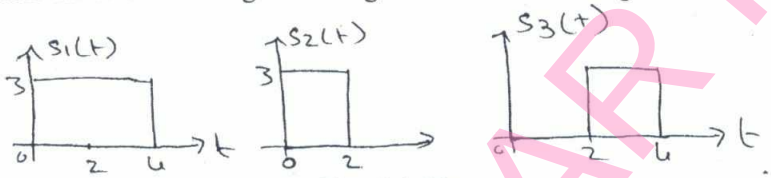

Fig. Q6 (b)

7 a. Derive the expression for maximum signal to noise power ratio of a matched filter. **(12 Marks)**

b. Explain the working of a correlation receiver with block diagram of a detector and vector receiver. **(08 Marks)**

8 a. Explain direct sequence spread spectrum technique with block diagram. **(08 Marks)**

b. Differentiate slow frequency hopping and fast frequency hopping. **(05 Marks)**

c. A 3-stage shift register with a linear feedback generates the sequence : 01011100101110

i) Determine the period of the given infinite sequence.

ii) Verify the three properties of the PN sequence for the given sequence. **(07 Marks)**

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10EC/TE62

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Microprocessor

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 architecture of 8086 microprocessor with a neat block diagram. **(10 Marks)**

b. Define addressing modes of 8086 and identify the addressing modes of the following instructions: i) add ax, [si] ii) mov al, [1000] iii) mov [bx + si + 06], bl iv) mov bx, [bp + 50] **(10 Marks)**

2 a. Discuss the functions of following instructions:
i) xlat ii) aam iii) das iv) imul bx
v) lds bx, [1234h] **(10 Marks)**

b. Write an ALP to multiply two-16 bit packed BCD numbers. **(06 Marks)**

c. Define the following assembler directives:
i) ALIGN ii) EVEN iii) ENDS iv) LOCAL **(04 Marks)**

3 a. Describe the following string instructions :
i) repe movsb ii) cmpsb iii) scasb iv) lodsb **(08 Marks)**

b. Write an ALP to scan for a character in a string and replace by another character. Use assembler directives. **(08 Marks)**

c. Write a program to convert binary byte to ASCII equivalent. **(04 Marks)**

4 a. Define an interrupt. Explain 8086 interupts and response mechanism. **(08 Marks)**

b. Write a macro for the following cases:
i) Read a character from keyboard without echo.
ii) Display a message on the CRT monitor.
iii) Display an integer on CRT monitor. **(06 Marks)**

c. Write a subroutine to print a string on printer. Call this subroutine from a main program to print two message strings. **(06 Marks)**

PART – B

5 a. Interface 4×4 keyboard to 8086 microprocessor using 8255 PPI. Write the necessary circuit diagram and program. **(10 Marks)**

b. Write an ALP to interface seven segment display to 8086 and demonstrate the display as flashing display. Write the necessary circuit diagram. **(10 Marks)**

6 a. Write the control word format of 8087 and define various fields. **(04 Marks)**

b. What are the functions of following 8087 instructions? Explain.
(i) FENI (ii) FCOMP (iii) FSTENV (iv) FLDL2E
(v) FLDZ **(10 Marks)**

c. Write 8087 ALP to compute the volume of the sphere. **(06 Marks)**

7 a. With a neat block diagram, explain the maximum mode operation of 8086. **(10 Marks)**

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

c. Show an interface of printer to a 8086 microprocessor. Define the signals of importance. **(04 Marks)**

8 Write short notes for the following:

a. Pentium microprocessor. **(08 Marks)**

b. Special registers of 80386. **(06 Marks)**

c. Memory structure of 80386. **(06 Marks)**

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10EC63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Micro Electronic Circuits

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 parameters with respect to MOSFET: i) Threshold voltage; ii) Overdrive voltage. **(05 Marks)**

b. Explain the breakdown effect occurs in MOSFET. **(05 Marks)**

c. Draw the biasing circuit using a drain to gate feedback resistor and explain it. **(05 Marks)**

d. For the circuit shown in Fig.Q.1(d), find the values of R and V_D to obtain a current I_D of 80μA. Let the NMOS transistor have $V_t = 0.6V$, $\mu_n C_{ox} = 200\ \mu A/V^2$, $L = 0.8\ \mu m$ and $W = 4\ \mu m$. Assume $\lambda = 0$. **(05 Marks)**

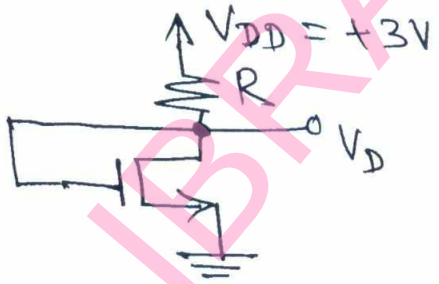

Fig.Q.1(d)

2 a. What are the disadvantages due to short-channel effects? **(05 Marks)**

b. The high frequency response of an amplifier is characterized by the TF $F_H(s) = \frac{1-\frac{s}{10^5}}{\left(1+\frac{s}{10^4}\right)\left(1+\frac{s}{4\times10^4}\right)}$. Determine the 3-dB frequency. **(05 Marks)**

c. What is current steering? Mention its advantages. **(05 Marks)**

d. Draw the circuit of basic MOSFET current source and explain it. **(05 Marks)**

3 a. Draw the circuit and small signal equivalent circuit of common source amplifier with active load and explain it. **(06 Marks)**

b. What is cascade amplifier and mention the basic idea behind the cascade amplifier? **(06 Marks)**

c. Draw the circuit of double cascading and explain it. **(08 Marks)**

4 a. Draw the transistor pairing circuits and mention the advantages of each pair. **(06 Marks)**

b. Draw the circuit of cascade MOS current mirror and explain it. **(06 Marks)**

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

PART – B

5 a. The differential amplifier shown in Fig.Q.5(a) uses transistors with $\beta = 100$. Evaluate:
   i) Input differential resistance (R_{id}).
   ii) Overall differential voltage gain V_o/V_{sig} (neglect the effect of V_o).
   iii) CMRR in dB. (Assume $A_{cm} = 5 \times 10^{-4}$).
   iv) Input common mode resistance (assuming that the early voltage $V_A = 100V$. **(10 Marks)**

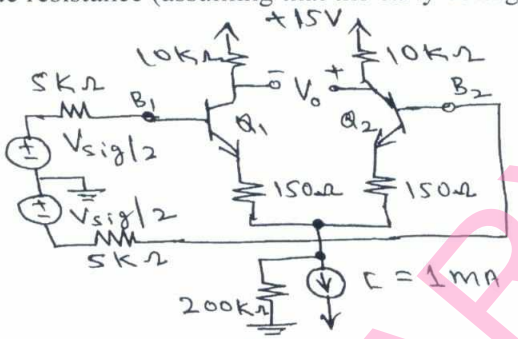

Fig.Q.5(a)

   b. Draw the two-stage CMOS Op-Amp circuit and explain it. **(10 Marks)**

6 a. Explain the properties of negative feedback. **(10 Marks)**
   b. Explain the effect of feedback on the amplifier stability and pole location. **(07 Marks)**
   c. What are the properties of current amplifier? **(03 Marks)**

7 a. Derive the expression for the closed loop gain V_o/V_{in} of the circuit shown in Fig.Q.7(a). **(08 Marks)**

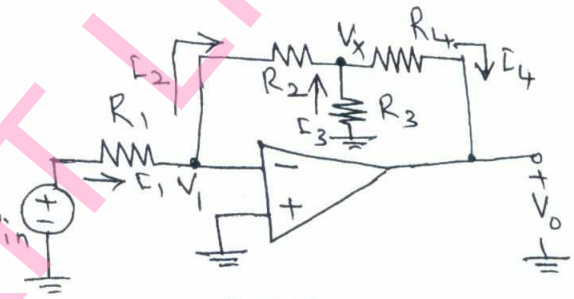

Fig.Q.7(a)

   b. With the help of mathematical analysis, explain how to minimize the temperature effect in logarithmic amplifier. **(10 Marks)**
   c. What are DC imperfections? **(02 Marks)**

8 a. Obtain the PUN from the PDN and vice versa for the following expressions:
   i) $Y = \overline{A(B + CD)}$ ii) $Y = \overline{\overline{A}(B + AC)}$ **(12 Marks)**
   b. Define the following parameters with respect to CMOS:
   i) Propagation delay
   ii) Robustness
   iii) Delay power product
   iv) Dynamic power dissipation. **(08 Marks)**

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10EC64

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Draw diagram wherever necessary.

PART – A

1 a. Obtain relation between directivity and beam width and also write equation for estimating directivity. **(05 Marks)**

b. A parabolic reflector antenna is circular in cross – section with a diameter 1.22 m. If the maximum effective aperture equals 55% of the physical aperture, calculate gain of antenna in dB at 20 GHz. **(07 Marks)**

c. Show that the maximum effective aperture of a $\lambda/2$ dipole is $\frac{30}{73\pi}\lambda^2$ and also obtain radiation resistance of $\lambda/2$ dipole is 73Ω. **(08 Marks)**

2 a. Derive Hansen–Woodyard condition for 'n' element end fire array for enhancing directivity. **(08 Marks)**

b. A linear uniform array of isotropic antennas satisfy the following parameter, obtain the field pattern and find BWFN and HPBW $\eta = 4$; $\delta = 0$; $d = \lambda/2$. **(07 Marks)**

c. Explain in detail pattern multiplication method in array synthesis. **(05 Marks)**

3 a. Derive an expression for power radiated by current element and radiation resistance of short dipole. **(09 Marks)**

b. Obtain an expression for field of dipole in general ($\ell \geq \lambda/4$) for thin linear antenna. **(06 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 1 mile from the antenna at the corresponding angle. **(05 Marks)**

4 a. Obtain expression for radiation resistance of loop antenna. **(08 Marks)**

b. The multiturn rod antenna of a broadcast receiver has 10 turns of 1 mm diameter copper wire wound on a ferrite rod 1 cm in diameter and 10cm long. For the ferrite rod $\mu_r = \mu_r' - \mu_r''$ $= 250 - j2.5$. Take the effective relative permittivity of ferrite rod $\mu_{er} = 50$. At 1 MHz find : i) the radiation efficiency ii) the Q factor iii) Half power bandwidth. **(06 Marks)**

c. The diameter of a circular loop antenna is 0.04 λ. How many turns of antenna will give a radiation resistance of 36 Ω? **(06 Marks)**

PART – B

5 a. Explain the radiation mechanism of microstrip patch antenna and its characteristics. **(06 Marks)**

b. Determine length ρ of the horn, H – plane aperture and flare angles θ_E and θ_H in (E and H plane) of a pyramidal horn for which E – plane aperture is 10λ. The horn is fed with a rectangular waveguide with TE_{10} mode. Let $\delta = 0.2\ \lambda$ in E plane and $0.375\ \lambda$ in H plane. Calculate beam width and directivity. **(08 Marks)**

c. Explain the basic concepts of reflector antenna and concepts involved in plane and corner reflector. **(06 Marks)**

6 a. Explain with suitable sketches perpendicular mode of radiation in helical antenna and obtain an expression for axial ratio and pitch angle. **(05 Marks)**

b. Write a short note on :
   i) Sleeve antenna
   ii) plasma antenna
   iii) embedded antennas. **(09 Marks)**

c. Explain in brief antenna for satellite communication. What are different design consideration for the same? **(06 Marks)**

7 a. Derive relation between radius of curvature of earth and the change in refractive index with height. **(08 Marks)**

b. Obtain an expression for field strength at receiving antenna for the wave propagation in free space. **(07 Marks)**

c. If a transmitting aerial is located at the top of a tower 200 m above the surface of the earth. Determine the maximum distance at which an air craft flying at an altitude 3000m will be able to receive signal form the transmitter. Assume that only LOS propagation involved. If the transmitting aerial has a power gain of 13 dB in direction of aircraft and the power radiated is 400 watts, determine the electric field strength of signal at the air craft. Assume an earth of 6350 kms radius. **(05 Marks)**

8 a. Explain what will happen if a radio wave with a frequency greater than the critical frequency is propagated to the ionosphere? Will it return back? Obtain the condition such that such a wave return back to the earth. **(07 Marks)**

b. Define the following :
   i) optimum working frequency
   ii) maximum usable frequency. **(06 Marks)**

c. In ionospheric propagation, consider that the reflection takes place at height of 300 km and that the maximum density in ionosphere corresponds to refractive index of 0.8 at 15 MHz frequency. Determine ground range for curved earth for which given frequency is MUF. **(07 Marks)**

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10EC65

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Mention the different classes of operating systems. What is the prime concern addressed in each class? **(04 Marks)**

b. Explain the functions of multiprogramming supervisor in detail. Also give the architectural support. **(10 Marks)**

c. Differentiate between Hard Real time Systems vs. Soft Real time Systems. **(06 Marks)**

2 a. List the features operating system fails to handle when installed in a different machine. **(02 Marks)**

b. Explain (i) System generation (ii) Configuration tools (iii) Dynamic configuration of supervisor. **(12 Marks)**

c. Explain monolithic structure of O.S. Give its drawbacks. **(06 Marks)**

3 a. Explain four kinds of process interaction. **(04 Marks)**

b. What are Event Control Blocks (ECBs)? Explain the fields contained in ECBs. Also explain event handling actions of kernel with diagram. **(08 Marks)**

c. What is a process? Explain with a neat diagram process states and state transitions in Unix. **(08 Marks)**

4 a. Give the difference between static and dynamic memory allocation. **(04 Marks)**

b. Explain with diagram merging free areas using bounding tags. **(08 Marks)**

c. Explain slab allocator used in solaris as one of kernel memory allocator. **(08 Marks)**

PART – B

5 a. What is demand paging? With a diagram explain the following with respect to demand paging: (i) Page faults (ii) Page in and page out operations (iii) Page replacement. **(12 Marks)**

b. Discuss memory mapping of a file by a process with diagram. Give its advantages. **(08 Marks)**

6 a. Discuss the various attributes of a file. **(04 Marks)**

b. List the various operations carried out on directories. Explain mounting of a file system. **(08 Marks)**

c. Describe file system actions at open, close and at file operations. **(08 Marks)**

7 a. With a neat schematic diagram, explain the concept of scheduling. **(05 Marks)**

b. Discuss the following non-preemptive scheduling policies:
(i) FCFS scheduling (ii) Shortest request next (SRN) (iii) Highest Response ratio next **(15 Marks)**

8 a. Explain Interprocess Message Control Block (IMCB). **(04 Marks)**

b. Write a note on mailboxes. Give the advantages of mailboxes. **(07 Marks)**

c. Explain the three interprocess communication features supported by unix. **(09 Marks)**

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10EC662

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Explain the following: i) Geosynchronous orbit ii) Geostationary orbit **(04 Marks)**

b. Explain the following: i) Earth eclipse of satellite ii) Sun transit outage. **(06 Marks)**

c. With the help of relevant diagram and equations explain the Kepler's three laws of planetary motion. **(10 Marks)**

2 a. What are the different losses occurs during the radio propagation in a satellite link? **(10 Marks)**

b. Derive the system noise temperature (T_S) expression for amplifiers connected in series. **(06 Marks)**

c. An LNA is connected to a receiver which has noise figure 12 dB. The gain of the LNA is 40 dB and its noise temperature is 120 K. Calculate the overall noise temperature referred to the LNA input. **(04 Marks)**

3 a. Explain what is meant by antenna noise temperature and amplifier noise temperature. **(06 Marks)**

b. Derive an expression for the carrier to noise in satellite link. **(07 Marks)**

c. Explain what is meant by input and output backoff. **(07 Marks)**

4 a. What is meant by satellite altitude control and briefly describe two forms of altitude controls? **(07 Marks)**

b. Explain what is meant by thermal control and why this is necessary in a satellite. **(06 Marks)**

c. Explain what is meant by frequency reuse, and describe briefly two methods by which this can be achieved. **(07 Marks)**

PART – B

5 a. With neat diagram, explain the master antenna TV system. **(10 Marks)**

b. With suitable diagram, explain the possible interference modes between satellite circuits and terrestrial station. **(10 Marks)**

6 a. With appropriate diagram, explain the operation of the spade system of channel assignment. **(10 Marks)**

b. Describe the general operating principles of TDMA system and also explain the different components of reference burst in a TDMA system. **(10 Marks)**

7 a. Explain the following: i) Power rating of transponders.
ii) Frequency and polarization.
iii) Transponder capacity. **(10 Marks)**

b. With neat diagram, explain MPEG-2 encoder used in digital video transmission. **(10 Marks)**

8 a. Explain the following satellite mobile services :
i) Asian cellular system ii) Globalstar iii) Thuraya **(10 Marks)**

b. Explain the following: i) VSAT ii) GPS **(10 Marks)**

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10EC665

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Programming in C++

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define preprocessor directives. State the purpose of following C++ preprocessor directives. (i) #include (ii) #define (iii) #ifndef **(08 Marks)**

b. What is dynamic memory allocation? Explain with code snippet for usage of 'new' and 'delete' operator for memory management in C++. **(06 Marks)**

c. Give comparison of object-oriented and procedure oriented programming languages. **(06 Marks)**

2 a. What is a variable? Mention the rules associated with declaration of variables, with examples. **(08 Marks)**

b. Define pointer. With suitable example highlight the difference between a pointer and a reference variable. **(06 Marks)**

c. What is enumerated data type? Explain. **(06 Marks)**

3 a. List out the different operators used for relational, arithmetic and logical operations. Also give their precedence and associativity. **(06 Marks)**

b. Explain Bitwise operators and bitset operations in C++ with examples for each. **(08 Marks)**

c. Write a C++ program to find whether the given number is prime or not. **(06 Marks)**

4 a. What is function prototype? Explain the call-by-value and call-by-reference parameter passing methods for swapping two variables containing integers. **(10 Marks)**

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

c. Write a recursive function to find factorial of 'n' numbers. **(04 Marks)**

PART – B

5 a. What is exception handling? Explain the need for it and the different types of exceptions. **(10 Marks)**

b. Mention the exceptions and design issues. **(05 Marks)**

c. Write a C++ program to test for a positive number using try and catch block. **(05 Marks)**

6 a. Explain the constructor and destructor functions with examples. **(08 Marks)**

b. Write a C++ program to calculate the surface area and volume of a sphere using equations $4\pi r^2$ and $\frac{4}{3}\pi r^3$ where 'r' is radius of the sphere. Use class name as 'sphere' and object 'mysphere' and member functions as vol( ) and s-area( ) **(12 Marks)**

7 a. Explain the purpose of operator overloading. Develop a C++ program to add two complex numbers by overloading the operator +. **(10 Marks)**

b. Explain the following with examples:
(i) Overloading operators ++ and – –
(ii) Overloading operators new and delete **(10 Marks)**

8 a. What is inheritance? Explain public, private and protected inheritance, with an example. **(10 Marks)**

b. Explain single and multilevel inheritance with examples. **(06 Marks)**

c. Write a note on base class and derived class. **(04 Marks)**

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