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10EC/TE61

Sixth Semester B.E. Degree Examination, June/July 2018

Digital Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Discuss in brief advantages and disadvantages of digital communication over analog communication. **(08 Marks)**

b. Specify the types of digital communication channels. Compare coaxial cable and optical fiber cable. **(06 Marks)**

c. A signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at a rate of 250 samples/sec.
i) Sketch spectrum of the sampled signal.
ii) Specify cut-off frequency of reconstruction filter.
iii) Specify the Nyquist rate. **(06 Marks)**

2 a. Explain the three basic functions of a Regenerative Repeater in a PCM system with a neat block diagram. **(06 Marks)**

b. 24 Analog signals, each having a bandwidth of 10 kHz are to be time division multiplexed and transmitted via PAM/AM. A guard band of 5 kHz is required for signal transmission from the PAM samples of each signal:
i) Determine the sampling rate for each signal.
ii) Transmission Band width. **(04 Marks)**

c. What is meant by Robust quantization? Derive the equation for Variance of quantization Error (σ_Q^2) from the basic principle of Non-uniform quantizer. **(10 Marks)**

3 a. A 10 kHz sinusoid with arc amplitude level of ±1V is to be sampled and quantized by rounding off. How many numbers of bits are required to ensure a quantization SNR of 45 dB? What is the Bit rate of the digital signal? If the sampling Rate is twice the Nyquist Rate. **(04 Marks)**

b. With a neat diagram, explain the concept of digital hierarchy in a Multiplexer. **(08 Marks)**

c. Consider a binary sequence with the values +a for symbol 1 and –a for symbol 0, with +a and –a are equiprobable. Determine the power spectral density for NRZ polar format and plot the spectra. **(08 Marks)**

4 a. Explain in brief with a neat diagram the concept of baseband data transmission. **(10 Marks)**

b. For the input binary data 1011101, obtain the output pre-coder and output duobinary coder. Explain how data can be detected at the Receiver. **(06 Marks)**

c. Explain in brief with a neat diagram adaptive equalization. **(04 Marks)**

PART – B

5 a. Explain with a neat diagram working of (i) coherent BPSK (ii) QPSK transmitter. **(10 Marks)**

b. A binary data is transmitted using ASK over AWGN channel at a rate of 2.4 Mbps. The carrier amplitude at the Receiver is 1 mv. Noise P.S.D $\left(\frac{N_0}{2}\right) = 10^{-15}$ Watts/Hz. Find the Average Probability of Error if the detector is coherent, Erfc(5) = 3×10^{-6}. **(06 Marks)**

c. A binary data stream is encoded using DPSK. Determine the encoded and decoded output for the sequence 101101100. **(04 Marks)**

6 a. Define conceptual model of a digital communication system. **(08 Marks)**

b. Prove the Gram-Schmidt orthogonalization procedure. **(12 Marks)**

7 a. State and prove properties of the matched filter. **(10 Marks)**

b. Explain with a neat diagram, Correlation Receiver. **(10 Marks)**

8 Write short notes on any FOUR:

a. Generation of PN sequence with example

b. DSSS transmitter and receiver

c. Fast and slow frequency hopping

d. Applications of spread spectrum

e. PN sequences and their properties. **(20 Marks)**

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10EC62

Sixth Semester B.E. Degree Examination, June/July 2018
Microprocessors

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Draw the internal architecture of the 8086 and explain. **(10 Marks)**

b. What is addressing mode? Explain the different addressing mode of 8086? Explain each with examples. **(10 Marks)**

2 a. Explain the following instructions :
i) LEA ii) IDIV iii) DAA iv) JNGE v) SHR. **(10 Marks)**

b. Explain various instruction formats used in 8086 with suitable example. **(10 Marks)**

3 a. Explain the following instructions with examples :
i) MOVS B ii) CMPS B iii) SCAS B iv) repeat prefix (REP) v) LODS. **(10 Marks)**

b. Write a 8086 procedure to convert packed BCD Number in AL to ASCII equivalent in AX. **(06 Marks)**

c. Compare procedure and macro. **(04 Marks)**

4 a. Explain atleast FIVE dedicated interrupts in 8086. **(10 Marks)**

b. What are hardware interrupts of 8086? Write the interrupt priority of 8086. **(05 Marks)**

c. Explain the software interrupt operation of 8086. **(05 Marks)**

PART – B

5 a. Write a keyboard procedure that scans the keyboard (4×4 matrix) and returns with numeric code of the key in AL. **(10 Marks)**

b. Explain the interfacing of a steppermotor to 8086 with necessary circuit diagram. Write an ALP to rotate the stepper motor clockwise by one complete rotation and anticlockwise by one complete rotation. **(10 Marks)**

6 a. Explain the data types of Numeric data processor 8087. **(10 Marks)**

b. Explain the function of the following instructions :
i) FCOMP ii) FENI iii) FDECSTP iv) FSTENV v) FYL2XP1 **(10 Marks)**

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

b. Write a note on USB. **(10 Marks)**

8 a. List the different registers in 80386. **(08 Marks)**

b. Explain basic features of Pentium processor. **(06 Marks)**

c. List the features of 80386 processor. **(06 Marks)**

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10EC63

Sixth Semester B.E. Degree Examination, June/July 2018
Microelectronic Circuits

Time: 3 hrs. Max. Marks:100

Note: ***Answer any THREE full questions from Part-A and any TWO full questions from Part-B.***

PART – A

1 a. Discuss the VI characteristics of the n-MOSFET in different regions by deriving i_D - V_{DS} relationship equation. **(12 Marks)**

b. Consider the circuit given in Fig.Q1(b). Let the voltage V_D be applied to the gate of another transistor for Q_2 as shown in Fig.Q1(b). Assume Q_1 and Q_2 are identical and $\lambda = 0$. Find the drain current and voltage of Q_2 and R at Q_1. Let $V_{DD} = 5V$, $V_t = 0.6V$, $\mu_n C_{ox} = 200\ \mu A/V^2$, $L = 0.8\ \mu m$, $\omega = 4\ \mu m$, $V_{OV} = 0.4\ V$. **(08 Marks)**

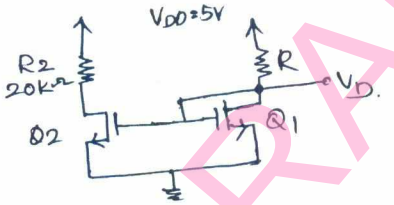

Fig.Q1(b)

2 a. Characterize the common source single stage amplifier with and without source degeneration circuit by deriving the amplifier parameters of R_{in}, V_i, V_o, A_V, A_{VO}, R_{out} and G_{VO}. **(10 Marks)**

b. Consider the circuit given in below Fig.Q2(b) to establish a dc current of $I_D = 0.5$ mA. The MOSFET is specified to have $V_t = 1$ V, $K'W/L = 1\ mA/V^2$. Let $\lambda = 0$, $V_{DD} = 15V$. If instead of given circuit fixed – Vgs bias circuit is used then find the value of required Vgs to establish $I_D = 0.5$ mA. Calculate in both the type of biasing circuits the percentage change in the value of I_D obtained when MOSFET is replaced with another unit having the same K(W/L) but $V_t = 1.5V$. [Hint : Choose R_D and R_S to provide 1/3 of V_{DD} as a drop across them]. **(10 Marks)**

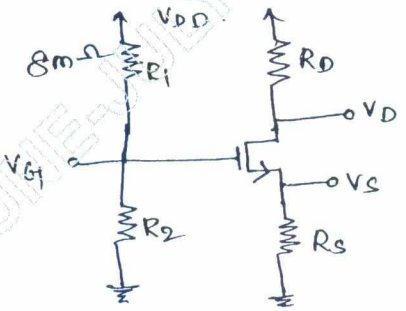

Fig.Q2(b)

3 a. What do you understand about current steering process? Draw and explain a BJT current steering circuit to generate number of constant currents of various magnitudes. **(07 Marks)**

b. What are the different short channel effects? **(05 Marks)**

c. For the given circuit in Fig.Q3(c) find the width of all the transistors. Let $V_{DD} = V_{SS} = 3V$, $V_{tn} = 0.6V$, $V_{tp} = -0.6V$, and all the channel length $L = 1\ \mu m$, $K_n = 200\ \mu A/V^2$, $K_P = 80\ \mu A/V^2$, $I_{ref} = 10\ \mu A$, $I_2 = 80\ \mu A$, $I_3 = 40\mu A$, $I_5 = 70\ \mu A$, and $\lambda = 0$. The required voltage at the drain of Q_2 allowed to go down to within 0.3V of negative supply and that the voltage at the drain of Q_5 be allowed to go upto 0.2 V of the positive supply. **(08 Marks)**

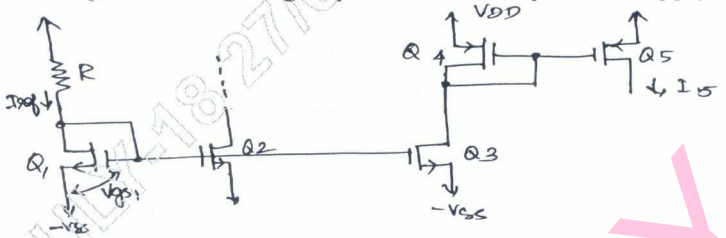

Fig.Q3(c)

4 a. Draw the circuit of common gate amplifier with its active loads. Discuss the small signal analysis and high frequency response. **(10 Marks)**

b. What are two different parameters that decides the performance of the current mirror. Explain the BJT Wilson current mirror circuit and compare it with cascode current mirror. **(06 Marks)**

c. Design Widler current source circuit for generating a constant current $I_o = 10\ \mu A$ which operate from a 10V supply. Determine the values of the required resistors assuming V_{BE} is 0.7 V at a current of 1 mA and neglecting the effect of finite β. **(04 Marks)**

5 a. Draw the circuit diagram and different stages of two stage CMOS op-amp and explain its structure with all its parameters. **(10 Marks)**

b. Discuss the large signal and small signal operation of the MOS differential pair. **(10 Marks)**

PART – B

6 a. Explain the different amplifiers to describe the four different feedback topologies. **(10 Marks)**

b. What do you understand about the frequency compensation method of an amplifier to maintain stability for desired value of gain? **(10 Marks)**

7 a. What are the different non-linear functional op-amp circuits? Explain them by deriving the expression for its output voltage. **(10 Marks)**

b. What are the limitations on the performance of op-amp circuits at large o/p signals? **(07 Marks)**

c. Design an inverting amplifier using op-amp having a gain of – 10 and input resistance of 100 kΩ. **(03 Marks)**

8 a. Implement the CMOS logic circuit for the expression y = A + B(C + DE). Provide the W/L ratios of all n-transistor in your circuit, with proper transistor sizing. Assume that for the basic inverter n = 2 and p = 5 and that the channel length is 0.18 μm. **(08 Marks)**

b. Design a level restored n-pass transistor logic circuit for the given expression Y = A + BC. Explain the concept of level restoration using your own circuit. **(06 Marks)**

c. Consider a CMOS inverter fabricated in a 0.25 μm process for which $C_{ox} = 6\ fF/\mu m^2$, $\mu_n C_{ox} = 115\ \mu A/V^2$, $\mu_p C_{ox} = 30\ \mu A/V^2$, $V_{th} = -V_{tp} = 0.4$ V and V_{DD} 2.5 V. The W/L ratio of Q_N is $\frac{0.375\mu m}{0.25\mu m}$, and that for Q_p is $\frac{1.125\mu m}{0.25\mu m}$. The gate-source and gate-drain overlap capacitances are specified to be 0.3 fF/μm of gate width. Further the effective value of drain body capacitances are $C_{dbn} = 1$ fF and $C_{dbp} = 1$ fF. The wiring capacitance $C_W = 0.2$ fF. Find propagation delay t_p. **(06 Marks)**

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10EC64

Sixth Semester B.E. Degree Examination, June/July 2018
Antenna and Propagation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following terms as related to antenna system:
   i) HPBW
   ii) Power density
   iii) Beam solid angle
   iv) Directivity
   v) Radiation resistance **(10 Marks)**

b. Calculate the exact directivity for the following sources:
   i) $u = u_m \sin^2\theta \sin^3\phi$ ii) $u = u_m \sin\theta \sin^3\phi$
   u has value only for $0 \le \theta \le \pi$ and $0 \le \phi \le \pi$ and is zero elsewhere. **(05 Marks)**

c. Define antenna aperture. Derive the relationship between aperture and beam area. **(05 Marks)**

2 a. State and explain power theorems in terms of power density and radiation intensity. **(05 Marks)**

b. Obtain the relative field pattern for an array of two isotropic point sources of same amplitude and opposite phase spaced $\lambda/2$ apart. **(10 Marks)**

c. Find the total power radiated and directivity of an antenna with radiation intensity. $u = u_m \cos^4\theta \sin^{-2}\phi$ for $0 \le \theta \le \pi/2$ and $0 \le \phi \le 2\pi$. **(05 Marks)**

3 a. Write an explanatory note on folded dipole antenna with neat figure. **(06 Marks)**

b. Show that the radiation resistance of $\lambda/2$ antenna is 73Ω. **(09 Marks)**

c. For a short dipole $\lambda/15$ long, find the efficiency, radiation resistance if loss resistance is 1Ω. Find also the effective aperture. **(05 Marks)**

4 a. Write a brief note on patch antenna. **(05 Marks)**

b. The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give a radiation resistance of 35Ω. **(06 Marks)**

c. What are the salient features of loop antenna? Obtain radiation resistance of a small loop antenna. **(09 Marks)**

PART – B

5 a. With a neat diagram, explain the working of yagi-uda antenna in detail with design formulae. Highlight its applications. **(08 Marks)**

b. A dish antenna operating at a frequency of 1.43GHz has a diameter of 64 metres and is fed by a directional antenna. Calculate HPBW, BWFN and gain with respect to $\lambda/2$ dipole with even illumination. **(05 Marks)**

c. Explain helical antenna with design considerations and working principle. Also highlight the applications of the antenna. **(07 Marks)**

6 a. Briefly write about various types of horn antennas with neat diagrams. **(05 Marks)**

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

c. Write short notes on:

i) Embedded antenna

ii) Ultra wide band antenna. **(10 Marks)**

7 a. Derive an expression for 'Line of Sight' distance (LOS) between transmitting and receiving antennas. **(06 Marks)**

b. Define wave tilt of a surface wave propagation. Also, prove that wave tilt,

$$\alpha = \tan^{-1}\frac{E_n}{E_v} = \tan^{-1}\left[\frac{1}{\sqrt{\epsilon_r}}\cdot\frac{1}{[1+x^2]^{1/4}}\right].$$ **(10 Marks)**

c. Explain duct propagation in brief. **(04 Marks)**

8 a. Define the following as related to ionospheric propagation with standard formulaes:
i) Virtual height ii) Critical frequency iii) Maximum usable frequency. **(09 Marks)**

b. Calculate the value of frequency at which the electromagnetic wave should be propagated in D-region given that refractive index $\mu = 0.5$ and electron density $\gamma = 10^{12}$ electrons/m^3. **(05 Marks)**

c. In an ionospheric wave propagation, the angle of incidence made at a particular layer at the height of 200km is 45°, with critical frequency 6MHz. Calculate the skip distance. **(06 Marks)**

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10EC65

Sixth Semester B.E. Degree Examination, June/July 2018
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What resource allocation function? Explain the strategies for resource allocation. **(04 Marks)**

b. With a neat block diagram of a model of a computer system, explain the program status word. **(08 Marks)**

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

2 a. Explain the layered structure of operating system. How it is superior compared to monolithic structure? **(04 Marks)**

b. What is virtual machine operating system? Explain VM/370 VMOS. **(08 Marks)**

c. Explain the structure of microkernel based operating system. **(08 Marks)**

3 a. What are fundamental process states? Giver the state transition diagram of a process. **(04 Marks)**

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

c. Explain control synchronization and need for control synchronization with an example. **(08 Marks)**

4 a. Explain memory allocation model for a process. **(04 Marks)**

b. Discuss the techniques used to perform fresh memory allocation form a free list. **(08 Marks)**

c. Explain the implementation of non contiguous memory allocation using segmentation. **(08 Marks)**

PART – B

5 a. What is virtual memory? How the virtual memory is implemented? **(04 Marks)**

b. State and explain the principle of locality reference of a process. **(06 Marks)**

c. A page reference string and reference timing string for a process P as follows :
Page reference string : 0, 1, 0, 2, 0, 1, 2 - - - - - -
Reference timing string : t_1, t_2, t_3, t_4, t_5, t_6, t_7 - - - - -
Illustrate the operation of optimal, FIFO and LRU page replacement policies. Assume there are 3 page frames allocated to process. **(10 Marks)**

6 a. What are the facilities provided by file system and IOCS? **(04 Marks)**

b. Discuss the linked allocation and File allocation table of disk space in file system. **(08 Marks)**

c. Explain File sharing semantics and disk space allocation in UNIX file system. **(08 Marks)**

7 a. Explain the fundamental technique of scheduling. **(04 Marks)**

b. Explain the operation of HRN policy of non-preemptive scheduling scheme for the following table. How starvation is over come in this scheme. **(10 Marks)**

Processes	P_1	P_2	P_3	P_4	P_5
Arrival Time	0	2	3	4	8
Service Time	3	3	5	2	5

c. List the main features of priority based scheduling and summarize its operations. **(06 Marks)**

8 a. What is message passing? Explain the issues in message passing. **(04 Marks)**

b. Illustrate the message passing using mailbox and explain its advantages. **(08 Marks)**

c. Discuss the inter process message communication in UNIX operating system. **(08 Marks)**

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10EC662

Sixth Semester B.E. Degree Examination, June/July 2018
Satellite Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

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

b. State Keplers three laws of planetary motion with the help of neat diagram and necessary equations. **(08 Marks)**

c. The apogee and perigee of an elliptical satellite orbit are 3000kms and 200kms. Determine the eccentricity semi major axis and semi minor axis. **(06 Marks)**

2 a. With the help of a neat sketch explain, i) Inclination ii) RAAN iii) Argument of Perigee. **(06 Marks)**

b. What are antenna look angles? How they are determined? **(06 Marks)**

c. Give the conditions for geostationary orbit. Determine the angle of tilt required for polar mount antenna used with an earth station at latitude 49°N assume earth's mean radius 6371 kms. **(08 Marks)**

3 a. Explain atmospheric and ionospheric losses for satellites. **(06 Marks)**

b. Show that the rain attenuation in dB is given by $A_p = \alpha R_p^b L_s r_p$ dB with usual notation. **(08 Marks)**

c. For the system given in Fig.Q.3(c)(i) and (ii), the receiver noise figure is 12dB, cable loss 5dB LNA gain 50dB and its noise temperature 150K, antenna noise temperature 35K. Calculate noise temperature referred to input conclude the result. **(06 Marks)**

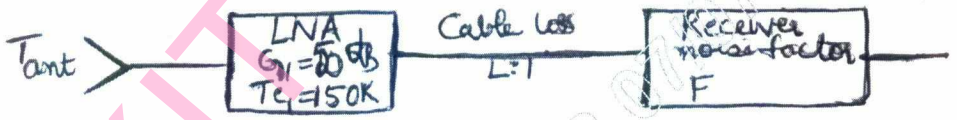

Fig.Q.3(c)(i)

Fig.Q.3(c)(ii)

4 a. With the help of neat diagram, explain two forms of attitude control. **(10 Marks)**

b. What is satellite transponder? With neat diagram explain the overall frequency arrangement of typical C-band communication satellite. **(06 Marks)**

c. Write a short note on Thermal control. **(04 Marks)**

PART – B

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

b. With the aid of a block diagram, describe the functioning of transmit receive earth station. **(10 Marks)**

6 a. What is meant by pre-assigned FDMA? With a neat diagram, explain single channel per carrier. **(10 Marks)**

b. Explain what the abbreviation "SPADE" system stands for. Explain in detail the operation of spade system. **(10 Marks)**

7 a. Explain the following:
i) Transponder capacity
ii) Frequency and polarization
iii) Bit rate and digital TV. **(10 Marks)**

b. Explain in detail Very Small Aperture Terminal (VSAT) and its applications. **(05 Marks)**

c. Explain in detail the Global positioning system. **(05 Marks)**

8 Write short notes on:
a. Radarsat
b. Orbital communication
c. Earth eclipse of satellite
d. Iridium. **(20 Marks)**

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