T.E /EXTC / SemV / Choice based / 09th May, 2019

(3 Hours)

Total Marks = 80

N.B.

1. Question No: 1 is compulsory.
2. Solve any three questions out of remaining questions.
3. Assume suitable data where necessary.

Q. 1 (a) Explain need of assembly language and compare with high level languages 05M

Q. 1(b) What is memory segmentation of 8086? Explain in brief. 05M

Q. 1 (c) Write an 8086 based program to read a character from keyboard of IBM PC and display it on the screen. Use INT 21H, function AH=07 that reads character input without echo in reg. AL and function AH= 02 to display a character stored in register DL. Explain logic of the program in brief. 05M

Q.1 (d) If (CS) = 5000H, (DS) = 6000H, (SS)= 7000H and (ES) = 8000H, draw the memory map of 8086 cpu with starting and end physical address of each segment. 05M

Q.2 (a) Explain Minimum mode of 8086 µp. Draw timing diagram for Read operation in minimum mode. 10 M

Q.2 (b) Ten, 8 bit numbers are stored in data segment. Write an 8086 based program to check whether at least one number out of these numbers matches with 20H or not. If match is found make AH =00H otherwise AH= FFH 10 M

Q.3 (a) Describe the features of Programmable Interrupt Controller 8259. What is master slave configuration of 8259 ? . 10 M

Q.3 (b) Write a program to find strength of positive and negative numbers among the series of 10 signed numbers. 10M

Q.4 (a) Explain the communication of Math co-processor with 8086. 10 M

Q.4 (b) Draw and Explain the interfacing of DAC 08 with 8086 Microprocessor. 10 M

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Q.5 (a) If analog voltage of 3.2V is connected to the IN3 channel of ADC 0809. Suggest hardware and write a program to convert analog voltage to its digital equivalent and store the value in AL register. Comment on the digital equivalent expected. 12 M

Q.5 (b) What are different types of buses in microprocessor based system? Discuss their role in the system in brief. 08M

Q.6 (a) Design an 8086 based system with 32K RAM (2 chips of 16K). Draw the memory map of the system designed. 10 M

Q.6 (b).Explain salient features of Programmable Interval Timer 8255. What are different modes of operations ? Explain in brief. 10 M

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TE / Sem V / choice based / EXTC / 15th May 2019

Paper / Subject Code: 32202 / Digital Communication

Time: 3 Hours **Marks: 80**

NB. 1. Question No. **1** is **compulsory**.
2. Attempt **any three** out of remaining five questions.
2. Figures to right indicate full marks.
3. Assume data wherever required and state it clearly.

Q1 20

a) Stating the relationship between PDF and CDF, give the properties of PDF.
b) Define Entropy of an information source? When is the entropy maximum?
c) Over a long transmission line draw the following data format for the binary sequence 10011101011.
i) Unipolar NRZ ii) Polar RZ iii) Manchester
Select the best and justify the answer.
d) Explain the role of Hamming distance in error detection & correction?
e) For impulse responses $g^1=\{1,1,0\}$, $g^2=\{0,1,0\}$, $g^3=\{1,1,1\}$ design the state diagram.

Q2

a) A discrete memoryless source has an alphabet of six symbol with their probabilities as shown: 10

Symbol	M_1	M_2	M_3	M_4	M_5	M_6
Probability	0.3	0.25	0.15	0.12	0.08	0.10

i) Determine the Minimum Variance Huffman code-words and average code-word length and hence find Entropy of the system.
ii) Verify the average code-word length using Shannon Fano.
iii) Compare and comment on the results of both

b) A convolution encoder has a constraint length of 3 and code rate of 1/3. The impulses for each are $g^1=100$ $g^2=101$ $g^3=111$. Draw 10

i) encoder
ii) state diagram
iii) code transfer function

Q3

a) State and prove the Conditional Probability. 10
b) Draw the signal space diagram for 16-PSK and 16-QAM and find their error probability. Also draw their PSD and determine bandwidth. 10

Q4

a) A parity check matrix of a (7,4) Hamming code is given as follows: 10

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

i) Find Generator matrix, using which find out the code-words of 1100 and 0101 ,
ii) Determine the error detecting and correcting capability of system,
iii) Draw the encoder for the above block code.

b) Sketch the encoder and syndrome calculator for the generator polynomial 10

$g(x)=1+x^2+x^3$ and obtain the syndrome for the received code-word 1101011.

Q5

a) Discuss the problem of inter symbol interference (ISI). Explain the measures to be taken to reduce ISI. How to study ISI using eye pattern? 10

b) Consider a convolution encoder with the constraint length K=3 and g^1= {1,0,1} and g^2={0,1,1}. Find the code vector for the message stream 11010 using time domain approach. Verify the code vector using transform approach. 10

Q6

Explain with the required diagrams **(Any Three):** 20

a) Modified duo-binary encoder

b) Shannon Hartley Theorem for Channel Capacity

c) Need for error control codes.

d) Define the following terms and give their significance

(i) Mean (ii) Central moment (iii) Variance (iv)Standard deviation

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32203

Paper / Subject Code: 32203 / Electromagnetic Engineering

E (EXTC) (Sem V) Choice Based - 21/5/19

Duration: 3 Hours Marks : 80

1] Question no. 1 is Compulsory
2] Attempt any three questions out of remaining questions
3] Assume suitable data if require

Q. 1 **Attempt any four** **20**

a) Explain Wave equation for free space.
b) Calculate Divergence and Curl of $\bar{F} = r\cos\varphi\,\overline{a_r} + rz^2\overline{a_\varphi}$ Units
c) Derive Faraday's Law with suitable applications.
d) Derive Laplacian's Equation for charge free dielectric region.
e) Explain Reflection Coefficient of Transmission lines.
f) Explain Gauss's Law in detail with applications.
g) Derive relationship between Electric field and Voltage.

Q. 2

a) Derive magnetic field provided by infinite thin filament caring current I suspended on 'z' axis. Also, provide significance over short filament. 10

b) Calculate input impedance of the lossless transmission line terminated by load impedance of $Z_L = 100 + 100j\ \Omega$ in $Z_0 = 50\ \Omega$ system with length of $l = 0.35\lambda$ with $f = 3GHz$, air as dielectric for transmission (Either by theoretical method or by Smith chart). 10

Q. 3

a) Find out total Electric field at Origin because of following charge distributions: 10
- Point charge of $20nC$ placed at $(-1,-2,-3)$
- Point charge of $50nC$ placed at $(-2,-3,-4)$
- Uniform infinite line charge of $2nC/m$ placed at $x = -5, z = -6$
- Uniform infinite surface charge of $0.5nC/m^2$ placed at $z = -5$

b) Explain Point and Integral format of Time Varying field Maxwell's Equation with appropriate examples. 10

Q. 4

a) If plane interface between two perfect dielectric mediums is located at $z = 0$. A 4GHz uniform planar wave travelling along z axis is incident from region 1, $z \leq 0$ onto region 2, $z \geq 0$. The wavelength in dielectrics are $\lambda_1 = 6cm$ and $\lambda_2 = 4cm$. Both the materials are non-magnetic. What are the percentage of energy on boundary is:
- Reflected
- Transmitted
- Standing wave ratio in region 1 10

b) Aircraft antenna radiates Electric field in air ($\sigma = 0, \mu = \mu_0, \varepsilon = \varepsilon_0$) which is $\bar{E} = 25\cos(10^9 t + 0.33x)\overline{a_y}\ KV/m$ find out following terms related with this EM System:
- Propagation constant (k)
- Phase Velocity
- Intrinsic Impedance (η)
- Average Poyting Power
- Magnetic Field ($\bar{H}$) 10

Q. 5

a) Two plates of cylindrical capacitor describe by their radius $\rho_1 = 1mm$ & $\rho_2 = 1mm$ holding voltage of $V_1 = 1V$ *and* $V_2 = 100V$ find out $\bar{E}$ in capacitor, also prove that dielectric of capacitor dose not carries any charge. 10

b) Derive Poynting Vector and explain effects of medium parameters on EM power with suitable diagram 10

Q. 6 **Write short note on** **20**

a) Super Conductivity

b) Helmholtz's Equation

c) Wave equation for transmission line

d) Electrical Discharge

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Sem IV | choice Base | EXTC | 27/05/2019

(3 Hours) [Total Marks: 80

N.B.: (1) **Questions No.1** is **compulsory**.
(2) Attempt **any three** questions out of remaining **five** questions.
(3) Assume suitable **data** if **required**.
(4) **Figures** to the **right** indicate **full marks**.

Q 1. Solve **any four** **20**

a) Compare Impulse invariant method and BLT method.
b) If x[n]={1,2,1,2} , determine X[K] using DIF FFT.
c) State and prove frequency shifting property of DFT.
d) Write a short note on replication.
e) State advantages of digital filters.

Q 2 a) Develop composite radix DITFFT flow graph for N=6=2*3. **10**
b) Design a digital Butterworth filter that satisfies following constraints using bilinear transformation method. Assume Ts=0.1s. **10**

$0.8 \leq |H(e^{jw})| \leq 1 \quad 0 \leq w \leq 0.2\pi$

$|H(e^{jw})| \leq 0.2 \quad 0.6\pi \leq w \leq \pi$

Q 3 a) Explain Dual Tone Multifrequency Detection using Goertzel's algorithm. **10**
b) Design a linear phase FIR low Pass filter of length 7 and cut off frequency 1 rad/sec using Hamming window. **10**

Q 4 a) Compute DFT of x[n]={1,2,3,4,5,6,7,8} using DITFFT algorithm. **10**
b) Explain Finite word length effects in digital filters. **10**

Q.5 a) Explain Architecture of TMS320C67XX DSP processor with the help of neat block Diagram **10**
b) Find DFT of x(n)={1,2,3,4}. Using these results and not otherwise find DFT **10**

i) $x_1(n)=\{4,1,2,3\}$
ii) $x_2(n)=\{2,3,4,1\}$
iii) $x_3(n)=\{6,4,6,4\}$

Q 6. Solve following **08**

a) Obtain digital filter transfer function by applying impulse invariance transfer function.

$H(s)=\frac{s}{(s+5)(s+2)}$ if Ts=0.1s.

b) Explain application of DSP processor to radar signal processing. **06**
c) Write short note on limit cycle oscillations **06**

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Paper / Subject Code: 32205 / Elective - I Microelectronics

TE/ EXTC/ SEM-V / Choice based / 31st May 2019

(3 Hours) **[Total Marks: 80]**

N.B.: **(1)** **Question No. 1 is compulsory.**
(2) **Solve any three questions from the remaining five questions.**
(3) **Figures to the right indicate full marks.**
(4) **Assume suitable data if necessary and mention the same in answer sheet.**

1. Attempt **any four** **(20)**
   a) Compare constant voltage scaling and full voltage scaling.
   b) Compare single ended and differential power amplifiers.
   c) Why folded cascode is very popular building block in CMOS amplifier? Explain its advantages over double cascade.
   d) Derive output resistance of MOS current source.
   e) What are the advantages of active load?

2. a) Design an NMOS current source to provide a bias current of $I_Q = 100\,\mu A$ and an output resistance greater than 20 MΩ. The reference current is to be $I_{ref} = 150\,\mu A$. The circuit is to be biased at $\pm 3.3\,V$ and the voltage at the drain of the current source transistor is to be no smaller than $-2.2\,V$. The minimum width to length ratio of transistor is to be unity. **(12)**
   b) Explain cascade current mirror in detail. **(08)**

3. a) For CS amplifier with current source load find intrinsic gain A_o and explain the effect of output resistance on gain. **(10)**
   b) For CS stage with resistive load amplifier prove that Gain $= -g_m r_d$. **(06)**
   c) Compare double cascade with folded cascade. **(04)**

4. a) Explain PMOS fabrication process with suitable diagrams. **(10)**
   b) Explain with proper diagram CLASS F power amplifier. **(10)**

5. a) Explain in detail fabrication of transformer. **(10)**
   b) Explain short channel effects in MOSFET. **(10)**

6. a) Explain DC transfer characteristics of MOS differential amplifier. **(10)**
   b) Calculate the DC characteristics of MOSFET differential amplifier shown in Fig. 6(b) the transistor parameters are $k_{n1} = k_{n2} = 0.1\frac{mA}{V^2}$, $k_{n3} = k_{n4} = 0.3\frac{mA}{V^2}$, and for all transistor $\lambda = 0$ and $V_{tn} = 1V$. Determine the maximum range of common–mode input voltage. **(10)**

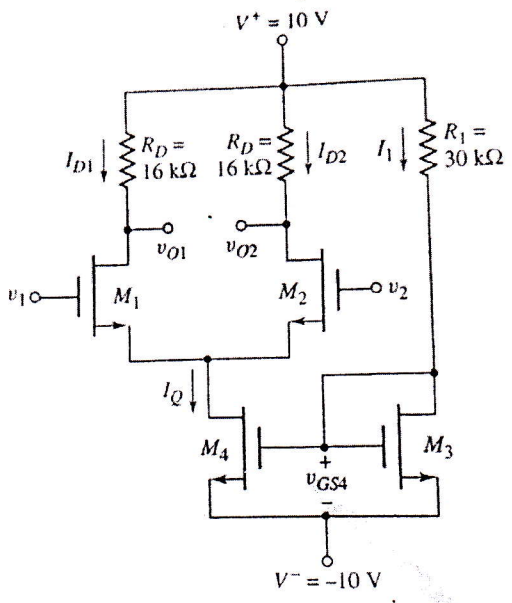

Fig. 6(b)

TE/ ExTC/ SEM-V / choice based / 31st May 2019

(3 Hours) [Total Marks: 80]

N.B. (1) Question No. 1 is compulsory.
(2)Attempt any three questions out of remaining five.
(3)Figures to the right indicate full marks.
(4)Assume suitable data if required and mention the same in answer sheet

1. Solve any four **20**
   (a) Why we use DCT in JPEG?
   (b) What is biometric authentication?
   (c) Why we need data compression?
   (d) What are the various models used for data compression?
   (e) Explain Chinese Reminder theorem (CRT) with example

2. (a) A Source emits letters from alphabet M=[m1,m2,m3,m4,m5] with probabilities P(m1)=0.15, P(m2)=0.05,P(m3)=0.25, P(m4)=0.05 and P(m5)=0.50. **10**
   i) Calculate entropy of this source. **10**
   ii) Find Huffman code for this source.
   iii) Find Average length of this code.
   iv) Find its redundancy.
   (b) What is the significance of prime numbers in public key cryptography? Explain RSA algorithm with suitable example.

3. (a) Explain : **10**
   i) Fermat's little theorem with example.
   ii)Euler's phi function with example
   (b) Take an alphabet string and show encoding procedure for LZ78 and LZW. Compare LZ78 and LZW **10**

(a) Explain the working of standard. DES with suitable diagram. 10

(b) Explain Ceaser Cipher and multiplicative ciphers with suitable examples and diagrams. 10

(a) Explain Hashed MAC with suitable diagram. 10

(b) Explain Intrusion detection system. 10

Write short note on **(any four)** 20

(a) μ-law and A- law Companding with digital audio

(b) S/MIME

(c) JPEG 2000

(d) Diffie-Hellman key exchange

(e) MPEG-2

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