



Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2018-19/

Date: _____

School: SoET-CBCS

Branch: EXTC ENGG.

SEM: V

To,
 Exam Controller,
 AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following Semester/Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Microprocessor & Peripherals Interfacing	ETC501		✓	02
2	Digital Communication	ETC502		✓	02
3	Electromagnetic Engineering	ETC503		✓	02
4	Discrete Time Signal Processing	ETC504		✓	02
5	Department Level Optional Course I Microelectronic	ETC505		✓	02
6	T-V & Video engg.			✓	02

Note: SC – Softcopy, HC - Hardecopy

(Shaheen Ansari)
 Librarian, AIKTC

TE Sem - V - choice Based - F.T.C

(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 μ p. 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

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



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

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 \vec{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

- a) Super Conductivity 20
- b) Helmholtz's Equation
- c) Wave equation for transmission line
- d) Electrical Discharge

(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

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

20

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 $T_s=0.1s$.

10

$$0.8 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq 0.2\pi$$
$$|H(e^{j\omega})| \leq 0.2 \quad 0.6\pi \leq \omega \leq \pi$$

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

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

08

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

b) Explain application of DSP processor to radar signal processing.

06

c) Write short note on limit cycle oscillations

06



[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B: 1. Question no. 1 is compulsory.
2. Out of remaining questions, attempt any 3 questions.
3. In all 4 questions to be attempted.
4. Answer to each new question to be started on a fresh page.
5. Figure in brackets on the right hand side indicate full marks for a question.
6. Illustrate answers with neat diagrams wherever necessary.

- Q.1 Attempt any four 10
- a. What is VSB transmission? Draw channel bandwidth diagram in PAL system
 - b. List electrical characteristics of PAL system
 - c. Explain why chroma is subsampled in digital TV system?
 - d. Which principle is used in vidicon camera tube? Draw vidicon camera tube and label parts.
 - e. What is Smart Television? Explain the features.
 - f. Explain what is IPTV?
- Q.2 a. Draw and explain composite video signal by labelling different parts. Give the details of vertical blanking and 12 sync pulse 12
- b. Explain how monochrome and colour television are made compatible? 8
- Q.3 a. What is interlaced scanning? Explain with appropriate diagrams 10
- b. List the advantages of digital television over analog television 10
- Q.4 a. Write short note on DCT 10
- b. Write a short note on image compression in MPEG2 10
- Q.5 a. What are DVB standards? Explain the characteristic features of DVB-T, DVB-C, DVB-S, DVB-H 10
- b. write a detailed note on satellite television communication system 10
- Q.6 a. What is MAC ? Explain how time compression is achieved in MAC? Draw and explain D2 MAC signal 10
- b. Explain working principle of LCD displays 10



- 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 cascode.
 - 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 $20 M\Omega$. 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 cascode 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 cascode with folded cascode. (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 $V_{th} = 1V$. Determine the maximum range of common-mode input voltage. (10)

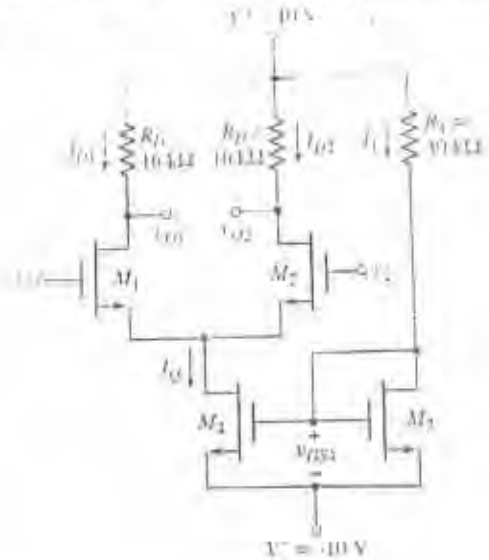


Fig. 6(b)