

(3 Hours)

[Total Marks : 80]

Solve any four

Assume suitable data wherever necessary

Q. 1. A. Explain Performance evaluation techniques. (10 marks).

Q1 B What is real time simulation. (10 mark)

Q. 2 A. Explain errors in random process modelling. (10)

Q 2 B. Explain sampling and interpolation with reference to Signals and Systems in Simulation. (10)

Q3 A. Explain Monte Carlo convergence. (10)

Q3 B. Explain simulation languages (High Level versus Low Level). (10)

Q 4 A. Solve following integral by Monte Carlo method (10)

$$I = \int_2^5 x^3$$

Q. 4B. Employ arithmetic congruential generator to generate a sequence of 10 random numbers given

$$R1 = 89$$

$$R2 = 38 \text{ and}$$

$$\text{Modulo } m = 23$$

(10)

Q5 A. Determine value of π by employing Monte Carlo method, and using relation (10)

$$\text{Area of circle} = \pi r^2$$

Q5 B. What is validation? Explain how to validate system model. (10)

Q6 A. What is role of simulation in communication system engineering? (10)

Q. 6 B. Explain simulation example of waveform level simulation of communication system. (10)

M.E. EXAM (E) (1620)

4/12/15

VLSI and mixed signal
Circuit & system

QP Code : 30066

(3 Hours)

[Total Marks : 80

- N.B. (1) Attempt any four questions out of six questions.
(2) Assume suitable data wherever required but justify the same.
(3) Figures to the right indicate full marks.

1. Solve any four:-

20

- (i) Implement $y = \overline{(A + B)(C + D)}$ using static CMOS and dynamic logic.
- (ii) Explain various problems associated with MOS Switches.
- (iii) List various short channel effects and explain one of them.
- (iv) Explain the difference between operational transconductance amplifier (OTA) and operational amplifier
- (v) Draw and explain transistorised SR latch circuit.

2. (a) Explain the design procedure for design of two stage operational transconductance amplifier with necessary equations to satisfy the following specifications 10

- (i) Gain
- (ii) Gain bandwidth
- (iii) Input common mode range (ICMR)
- (iv) Slew rate
- (v) Output swing
- (vi) Power dissipation.

(b) What are advantages and disadvantages of pass transistor logic in design of VLSI circuits? How disadvantages of pass transistor logic are overcome? Explain with the help of suitable example. 10

3. (a) Explain the working of switched capacitor Integrator in detail. 10

(b) Explain analog design rules and layout techniques used in analog design flow. 10

4. (a) With neat diagram discuss the basic charge pump PLL. Also draw linear model of a simple charge pump PLL and explain its characteristics. 10

(b) What are different performance parameters of voltage controlled Oscillator (VCO)? Explain the same. 10

5. (a) For the circuit shown in Fig. 5a, pull up transistor ratio is $\left(\frac{W}{L}\right) = \frac{5}{5}$ and pull- 10

down transistors ratio $\left(\frac{W}{L}\right) = \frac{100}{5}$. For all transistors $V_{TO} = 1V$ Neglect body

bias.

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- (i) Identify the worst case input combination for V_{OL}
 (ii) Calculate the worst case value of V_{OL} .
 Assume for all transistors $\mu_n C_{ox} = 50 \mu A / V^2$

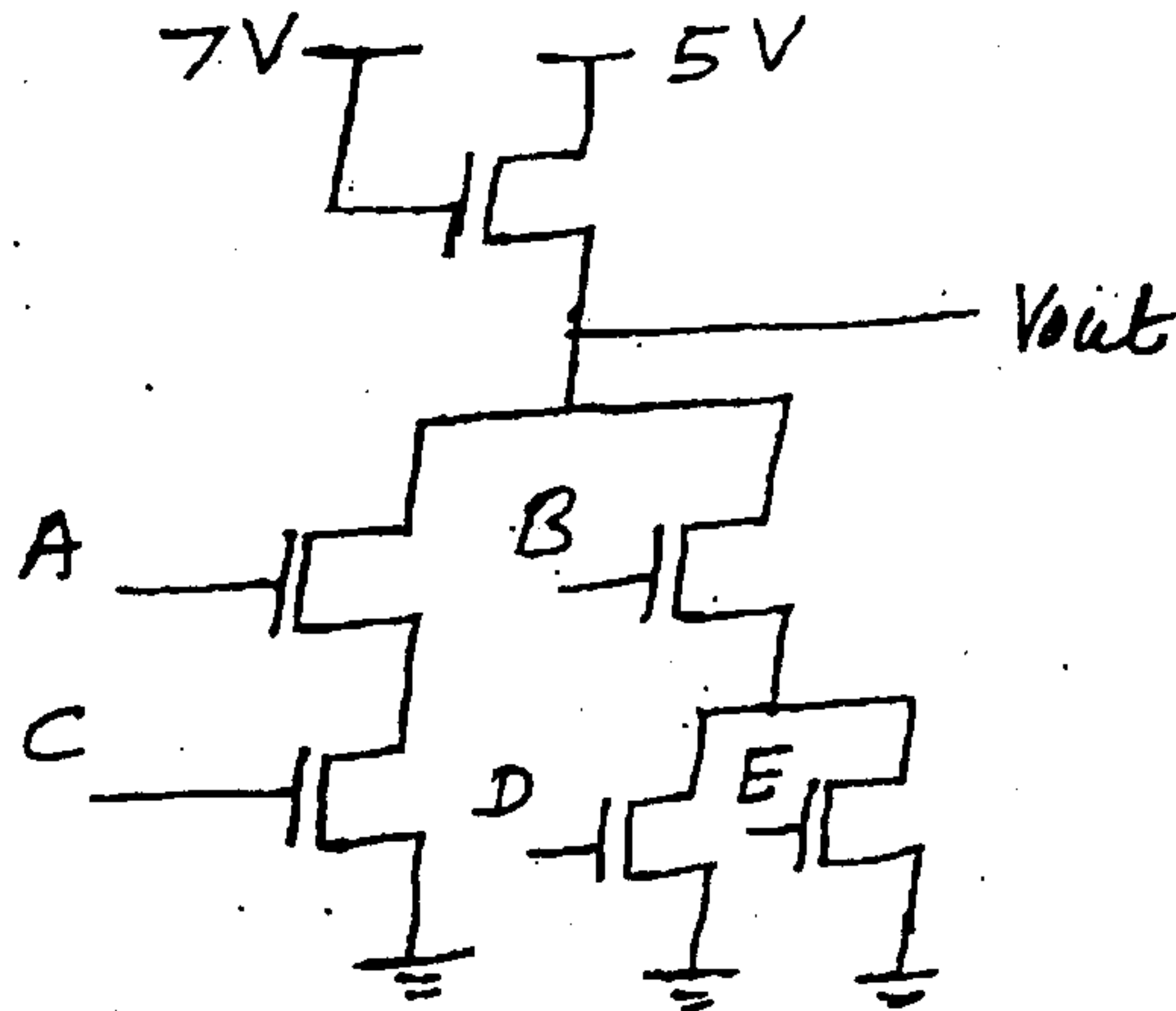


Fig. 5a.

- (b) Explain various sources of power dissipation and its reduction techniques in CMOS logic. 10
6. Write Short notes on any three:- 20
- (i) MOSFET Scaling
 - (ii) System on chip and system in package
 - (iii) MOS device models used in simulation
 - (iv) Active current mirror.

MEMS

Q.P. Code : 30076

(3 Hours)

Total Marks : 80

- N.B:** (1) Answer any four questions out of six questions.
 (2) Assume suitable data wherever required.
 (3) Figures to the right indicate full marks.

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|--------|--|----|
| 1. (a) | With the help of neat schematic diagram explain important design considerations of planar inductors. | 10 |
| (b) | With comb structure explain working of MEMS area-tuning capacitor. | 10 |
| 2. (a) | Discuss design aspects of co-planar transmission lines. | 10 |
| (b) | Explain different micromachining techniques to improve antenna performance. | 10 |
| 3. (a) | What are the types of phase shifters? Discuss their Limitations. | 10 |
| (b) | Explain functioning of Gap-tuning capacitor in case of electrostatic tuning. | 10 |
| 4. (a) | How beam steering is achieved using micromachined reconfigurable patch radiator? | 10 |
| (b) | Give modeling aspects of mechanical filters. | 10 |
| 5. (a) | What are the key parameters in the design of Microstrip patch antenna ? | 10 |
| (b) | Describe dynamics of switching operation. | 10 |
| 6. | Write short notes on the following:- | |
| (a) | Micromachined directional coupler | 05 |
| (b) | Dielectric tunable capacitors | 05 |
| (c) | Design issues of planar inductors | 05 |
| (d) | Electromechanical & Electrostatic relays | 05 |

Advanced Satellite Communication.

Q.P. Code : 30069

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Attempt any Four questions out of Six question.
 (2) Assume suitable data if necessary. But justify the same.

1. (a) What parameters govern the lower and upper limit of frequency at which a satellite can operate? What are the various services offered by satellite communication system. 10
- (b) How a transparent repeater is different from regenerative repeater. Explain regenerative repeater with the help of a block diagram. 10
2. (a) What is the significance of link budget? Why back off is considered in multicarrier satellite communication link budget equation. Derive an expression of uplink received power in terms of transmitted power Gain of transmitted and received antenna and other suitable parameters. 10
- (b) A receiving system consists of an antenna with noise temple of 60K. Its output is fed to a LNA having gain of 30 dB and noise temperature of 100K The coaxial line connecting LNA and main receives has a loss of 2dB and noise figure of 10 dB. Calculate system noise temperature referred to input. 10
3. (a) What are Kepler's law. Why a satellite's orbit deviate from the prediction of kepler's law. What is the effect of atmospheric drag and non-spherical shape of earth on keplerian orbit? 12
- (b) What do you understand by cross polar discrimination and polarization isolation. 8
4. (a) How a satellite is launched into geostationary orbit from the earth. Why a launching site should be located close to the equator. 10
- (b) Explain with the help of diagram working of a cassegrain parabolic reflector antenna. What are advantages of this antenna over a front feed parabolic reflector antenna. 10
5. (a) Telemetry tracking and command plays an important role in satellite communication system. Justify it. Explain its working with help of a block diagram. 10
- (b) Draw a typical block diagram of transmit receive earth station. Explain its working. Explain and compare heavy, medium and thin runte traffic. 10
6. (a) What do you understand by reliability. How reliability of a satellite communication system can be increased. 10
- (b) Explain what is meant by satellite attitude and briefly describe two forms of attitude control. 10

Speech processing

Q.P. Code : 30073

(3 Hours)

[Total Marks : 80]

NOTE:

- 1) Attempt any **four** questions from **Six** questions
- 2) Assumptions made should be clearly stated.
- 3) Assume any suitable data wherever required but justify the same.

Q1.

5 X4 = 20

- a) Consider time windows for speech analysis
 1. What are the advantages and disadvantages for short and long windows
 2. What type of filter the spectrum of windows correspond to? What is pre-emphasis and how can it help in speech analysis
- b) Define Short time ZCR and explain how STZCR can be computed for speech signals
- c) For the signal $x(n)$ given below .Obtain the AMDF

n	<0	0	1	2	3	4	5	≥ 6
$x(n)$	0	1	4	1	-1	-4	-1	0
- d) Explain Spectral subtraction technique of speech enhancement

Q2

- a) Explain the human speech production system with the help of a block diagram 5
- b) Draw and explain the general discrete time model of speech production 10
- c) Explain DPCM in detail 5

Q3

- a) Using wave equations derive the formula for formant frequency after deriving a steady state solution for pressure p and volume u in a uniform lossless tube excited by a sinusoidal glottal source. Also obtain vocal tract function $V_a(s)$ in 's' domain and draw pole-zero diagram 10
- b) Give with examples the Acoustic Characteristics of Vowels, Diphthongs, Semivowels and Fricatives 10

Q4

- a) Derive an expression for the gain G , if input is voiced in linear predictive analysis and synthesis 6
- b) Given $s(n) = G\delta(n) + 3s(n-1) + 6s(n-2)$
 - i. Find an expression for autocorrelation $R(k)$
 - ii. Obtain G if $R(0)=10$, $R(1)=1$ and $R(2)=0.5$ 4
- c) With the help of block diagram explain parallel synthesizer 10

Q5

- a) Consider the analysis of a 20msec speech sound segment (sampling rate = 10KHz) using a 1024 point DFT. There is a sharp peak in the signal spectrum at 850Hz.
 - a. What are the number of samples of speech signal analysed ?
 - b. Which bin number does the highest amplitude DFT sample correspond to?
 - c. How will the answer in 'a' and 'b' change if 40msec data window is used?
 - d. Which bin number will be the highest if a 20msec speech segment is used but its sampling rate is doubled. 10

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- b) Explain Adaptive DPCM (ADPCM) using a block diagram. 5
 c) What is pre emphasis and how can it help in speech analysis 5

Q6

- a) Explain in brief the function of each block of a typical speech recognition system. 5
 b) Derive an expression for Signal to noise ratio SNR of a speech signal $x(n)$ and quantization noise $e(n)$ assuming uniform distribution for the noise over the range of step size Δ 5
 c) The short time energy is defined as

$$E_n = \sum_{m=-N}^N h(m)x^2(n-m) = x^2(n) * h(n)$$

Find the difference equation that expresses E_n in terms of E_{n-1} and input $x(n)$ if

$$\begin{aligned} h(n) &= a^n u(n) \quad n \geq 0 \\ &= 0 \quad n < 0 \end{aligned}$$

Also draw its digital network diagram 5

- d) From the vowel triangle give the articulatory and acoustic characteristics of 5
 /ʌ/ : hut /u/ : boot

ME EXTC CBAS SEM-I
Electre-II Next Generation
Networks

05/12/2011

Q.P. Code : **30082**

(3 Hours)

[Total Marks : 80

- N.B. :1) Question No. 1 is compulsory.
2) Solve any three out of remaining questions
3) Figures to the right indicate full marks.

1. A What is effect of NGN on the market definition and failure? 5
B Explain the concept of "5C and 5 any" of ubiquitous networking. 5
C What are the general requirements of NGN IPv6 based networks? 5
D What are the benefits to the customers with NGN? 5
2. A How are NGN QOS classified? What are the factors affecting the classes of service? 10
B Explain the functional architecture of GSN-NGN. 10
3. A Write a note on control and signaling protocol for NGN. 10
B Explain the various naming, numbering and addressing scheme in NGN. 10
4. A How NGN influences on overall economic growth? 10
B Write a note on IP Multimedia Subsystem for NGN. 10
5. A What are various next generation mobile service? Explain. 10
B How IP-based networks are classified? Compare IPV4 and IPV6 based NGN. 10
- 6 Attempt any two : 20
A Session Initiation Protocol
B Threats and vulnerability in security mechanism in NGN
C Mobile IPTV service with challenges and application
D Location Based Services (LBS) and Content Based Services (CBS)

Q.P. Code : 30079

(3 Hours)

[Total Marks :80

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **three** questions out of remaining **five** questions

(3) Assume suitable data wherever required with justification.

(4) **Figures** to the right indicate **full** marks.

1. For a finger print recognition and door locking system draw the system diagram (minimum system) and data flow diagram. Explain the need of following system requirements to make it Real-time: 20
 - (a) Hardware Requirements
 - (b) Software requirements
 - (c) Task partition
 - (d) Need and type of scheduler
 - (e) Release time, deadline & execution time of tasks.
2. (a) Explain Multi function I/O Pins of Mixed Signal Processors. 10
(b) Explain the types of pipeline stages of various ARM processors. 10
3. (a) Compare non Real Time Operating System versus RTOS. 10
(b) What is mail box? How it passes message during inter process communication? 10
List the difference between mail box and pipe.
4. (a) Draw and explain the operating modes and states of ARM Processor. 10
(b) List various interal bus interfaces of ARM Processor and explain their Performance issues. 10
5. (a) Write a program and explain ARM and THUMB interworkiog. 10
(b) Explain system interrupts of ARM. 10
6. Explain any **four** of the following: 20
 - (a) Two wire bus
 - (b) Clock sources of MSP
 - (c) Write equivalent ARM code : if (a>=0) func(1)
 - (d) Data type of ARM
 - (e) EDF algorithm

QP Code : 30057

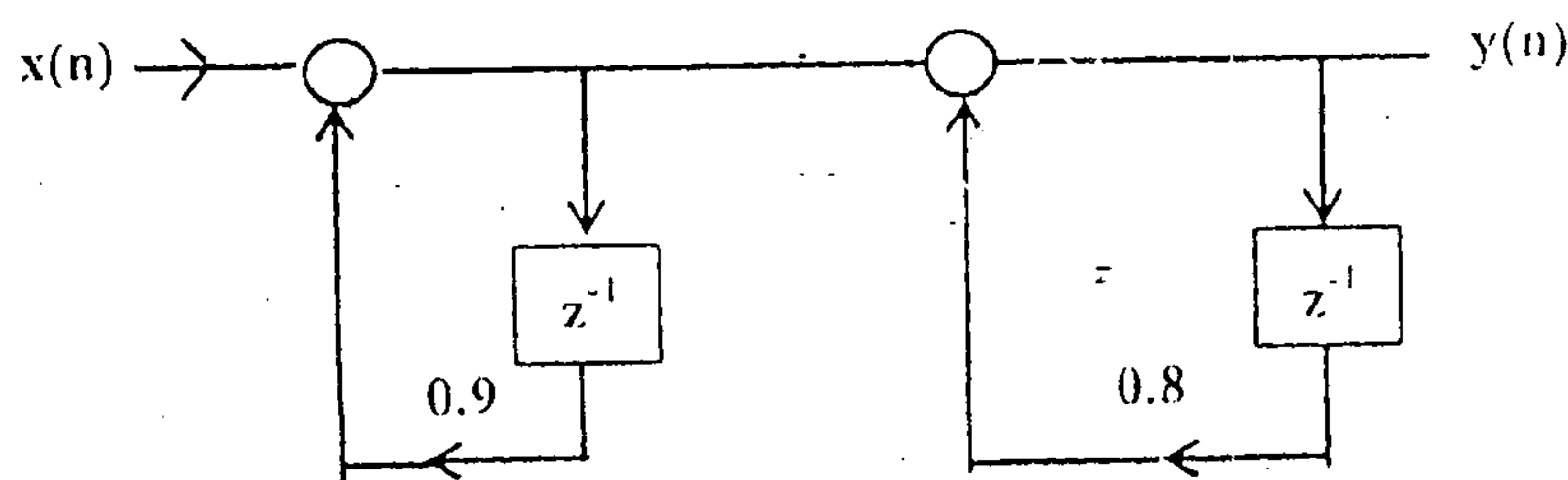
(3 Hours)

[Total Marks : 80

- N.B.:** (1) Attempt any **four** questions
 (2) Assume suitable data wherever necessary, justify the same
 (3) Figures to the **right** indicate **full marks**

1. a. Explain in brief real time DSP system. 5
 - b. Explain sampling rate conversion by non-integer factors 5
 - c. Explain very long instruction word (VLIW) architecture used for P-DSPs. 5
 - d. Explain how power spectral density of a given 5 volts and 1000Hz sinusoidal discrete time sequence of 1024 data points, sampled at 5000Hz is calculated using FFT. 5
2. a. Compute 8-point DFT of sequence $x(n) = \{1, 2, 3, 4, 1, 2, 3, 4\}$ using DIF-FFT algorithm 10
 - b. A cascade realisation of the two first order digital filter is shown below. 10
 The system functions of the individual sections are

$$H_1(z) = \frac{1}{1-0.9z^{-1}} \text{ and } H_2(z) = \frac{1}{1-0.8z^{-1}}$$

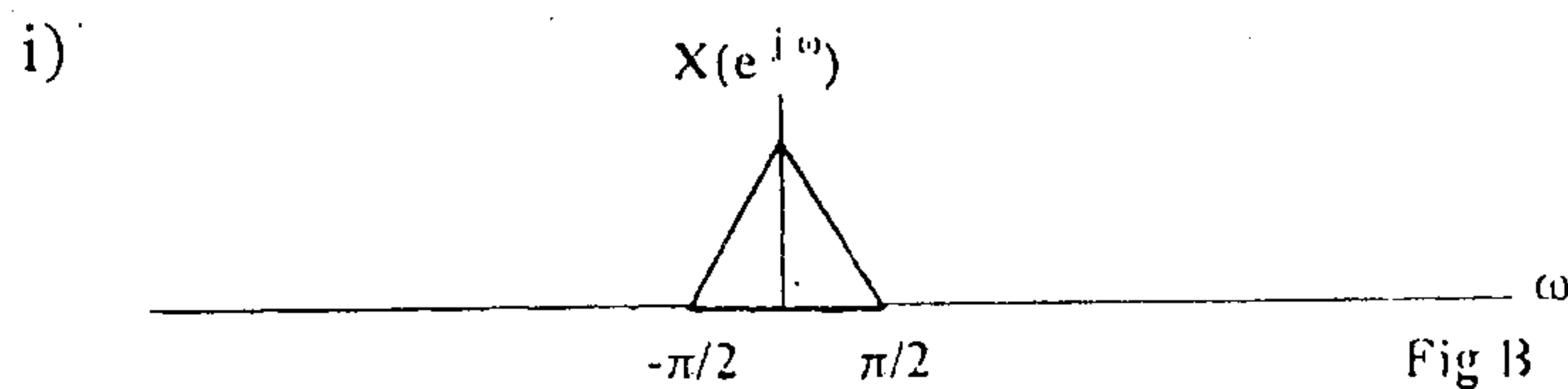


Draw product quantisation noise model of the system and determine the overall output noise power.

3. a. Design a band pass FIR filter for the following specifications 10
 Cutoff frequencies = 400 Hz to 800 Hz
 Sampling frequency = 2000Hz
 Filter length = 11
 Use rectangular window
- b. Design IIR digital Butterworth filter to satisfy the constraints 10
 $0.707 \leq |H(e^{j\omega})| \leq 1$ $0 \leq \omega \leq 0.5\pi$ and
 $|H(e^{j\omega})| \leq 0.2$ $0.75\pi \leq \omega \leq \pi$
 With $T = 1$ sec. Apply Bilinear transformation.

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4. a. Implement a two stage decimator for the following specifications 12
 Sampling Frequency = 20KHz
 Decimation factor 'D' = 100
 Passband = 0 Hz to 40 Hz
 Transitionband = 40 Hz to 50 Hz
 Passband ripple = 0.02
 Stopband ripple = 0.002
- b. The spectrum of discrete time signal is as shown in figure B. Sketch the spectrum of 8



5. a. Define periodogram and explain how DFT and FFT are useful in power spectral estimation 6
 b. What are limitation of non-parametric methods in spectral estimation 6
 c. Discuss power spectrum estimation using Welch method 8
6. Write short notes on **any Four** 20
- i) Audio applications of DSP
 - ii) Telecommunication applications of DSP
 - iii) Biomedical applications of DSP
 - iv) General purpose digital signal processors
 - v) Polyphase implementation of Decimator and Interpolator
 - vi) Effect of finite word length in digital filters

QP Code : 31758

(REVISED COURSE)

(3 Hours)

[Total Marks : 80

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

1. A) Write an assembly language program to implement PI Controller. 10
B) Explain the functional blocks of Digital Signal Processor used to implement above expression. 10
2. A) Write an Embedded "C" program and explain what is hardware initialization to implement Real-time signal Processing. 10
B) Explain various data types supported by TMS320C6x DSP. 10
3. A) Compare the architecture features of fixed point processors versus floating point Digital Signal Processors. 10
B) For MAC implementation draw Time Space diagram explain the pipelining mechanism of TMS 320c54xx processor. Give percentage of throughput efficiency for the given example. 10
4. A) Draw the functional diagram of ADSP-210xx processor and explain its bus structure. 10
B) List the on chip peripherals and their functions. 10
5. A) Explain various addressing modes of TMS320c54x Digital Signal Processor. 10
B) Explain circular addressing and bit reversed addressing modes. 10
6. A) Explain advanced bus structures and its advantages in DSPs. 10
B) Explain Microprocessor & Microcomputer mode in DSP. 10