M.E (EXTC) I Rev. 13/5/2013.
Optical Fiber Comm

18 : 1st half.13-AM(x)
Con. 8523-13.

BB-6991

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from the **remaining**.
(3) **All** questions carry **equal** marks.

Q1. (a)Explain the three operating windows in optical communication. (20)

(b)Explain Frequency chirping in detail.

(c) What is soliton ?

(d)What is effective area?

Q2. (a) Explain the gain process in a SOA and state its application. (10)

(b)Explain the different phenomena responsible for signal degradation as the light wave propagates through an optical fiber. (10)

Q3(a) An optical amplifier is operating at 1.3 wavelength with input power 0.5mW and noise figure of 4dB. What is the receiver bandwidth if SNR at the output is 30dB . (08)

(b) Explain the principle of a laser generation and discuss Vertical Cavity surface Emitting laser (VCSEL). (12)

Q4(a)A lithium Niobate modulator designed for operation at wavelength of 1.3μm is 2cm long with a distance between the electrode of 25 μm. determine the voltage required to provide a phase change of π radians given that the electro optic coefficient for lithium Niobate is $30.8 \times 10^{-12} mv^{-2}$ and its Refractive index is 2.1 at 1.3μm. (10)

(b) What are the different network topologies? Explain the performance of star architecture. (10)

Q5 (a). Explain any one optical fiber network topology. (10)

(b).What are different types of nonlinearity? Explain any two. (10)

Q6. Write short notes on (1) Beam splitters (2) Optical modulators (3)photonic crystal fibers (4) optical mems. (20)

ME (EXTC) CGS 24/5/13

Elective I : VLSI & mixed sig. ckt & system.

ws-Con-2013-20

Con. 8778-13. **BB-7012**

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

N. B.: 1. Attempt any **four** questions from six questions.
2. **Figures** to **right** indicate full marks.
3. Assume **suitable** data if **necessary.**

Q1.	**Design** two stage operational amplifier(OTA) for the following specifications $A_v > 3000V/V$, VDD = 2.5V, VSS = -2.5V, phase margin =60° Gain bandwidth product (GBP) = 5MHz, CL(load capacitance) = 10pF, Slew Rate > 10V/μs, Vout range = ±2V, Power dissipation (Pdiss) ≤ 2mW. Input common mode gain(ICMR) = -1 to 2V. Assume the channel length is to be 1μm. Use results of above problem and design compensation circuitry so that the RHP zero is moved from the RHP to the LHP and placed on top of the output pole $p2$.	(20)
Q2. (a)	Explain the working of any CMOS logic circuits with MOS load.	(10)
(b)	Explain the different types of comparator used in PLL. Justify why Phase frequency Detector (PFD) is preferred in charged pump PLL.	(10)
Q3. (a)	Explain why the mobile charge density cannot drop to exactly zero at any point along the channel. What happens beyond the pinch –off point in MOS transistor?	(10)
(b)	Explain the switched capacitive integrator circuit in detail.	(10)
Q4. (a)	A simple sampling switching circuit consists of MOS switch and capacitor. If applied input voltage is level changed from 0 to 1V(i. e logic 0 to logic 1), calculate Vout as the function of time.(assume VDD= 1V, λ=0)	(10)
(b)	Explain the importance of analog design in the digital world	(10)
Q5. (a)	Explain analog design rules and layout techniques used in analog design flow.	(10)
(b)	Explain the working of CMOS D latch and triggered Flip-flop.	
Q6.	**Write a short note on** (Any two)	(20)
(a)	Power management and packaging issues in AMS design.	
(b)	Active current mirror circuit	
(c)	Dynamic of CMOS circuits	

M. E EXTC SEM I (REV)
Statistical Signal Analysis

8/5/13

24 : 1st half.13-AM(v)
Con. 7881-13.

BB-6976

(3 Hours) [Total Marks : 80

N.B. : (1) Attempt any **four** questions out of **six**.
(2) Assume suitable **data**, if **necessary** and justify the **same**.

1. (a) The received signal in an AM system is $Y(t) = A(t) \cos(2\pi f_c t + \theta) + N(t)$, where N(t) is a band-limited white noise process with spectral density **10**

$$SN(f) = \begin{cases} \frac{No}{2} & |f \pm fc| < W \\ 0 & \text{elsewhere} \end{cases}$$

Find the signal to noise ratio of recovered signal.

(b) State and prove CENTRAL LIMIT THEOREM. **10**

2. (a) A space craft has 100000 components ($n \to \infty$). The probability of any one component being defective is 2×10^{-5} ($p \to 0$). The mission will be in danger if five or more components become defective. Find the probability of such a event. **5**

(b) A fair coin is tossed twice and let the random variable X represent the number of heads. Find $F_x(x)$. **5**

(c) Consider the Random process : **10**

$Y(t) = (-1)^{N(t)}$

Where N(t) is a Poisson process with rate λ. Y(t) starts at Y(0) = 1 and switches back and forth from +1 to −1 at Random Poisson time Ti. Find the mean and Auto correlation of Y(t) and show that Y(t) is not wide-sense stationary process.

3. (a) Show that the Weiner Process is a Gaussian Random Process. **10**

(b) A communication system consists of n components, each of which will, independently function with probability p. The total system will be able to operate effectively if at least one half of it's component function. **10**

(i) For what values of p is a 5-component system more likely to operate effectively than a 3 component system ?

(ii) In general when is a (2k + 1) component system better than a (2k − 1) component system ?

4. (a) Consider a Markov chain with transition probability Matrix $p = \begin{bmatrix} p & q \\ q & p \end{bmatrix}$, **10**

where $0 < p < 1$, $p + q = 1$

Suppose that initial distribution is $p(0) = [\alpha \;\; 1 - \alpha]$. Find the :–

(i) Probability distribution after one step.

(ii) Probability distribution after two steps.

(iii) Probability distribution after infinite number of steps.

(b) State and explain Little's formula. **10**

[TURN OVER

5. (a) Let X_n be a sequence of iid Gaussian random variables with zero mean and variance 6^2. Find the joint pdf and autocovariance of the corresponding sum process at times n_1 and n_2. **10**

   (b) State and prove that Chapman-Kolmogorov equation. **10**

6. (a) Write a detailed note on Kalman filter. **10**

   (b) Explain M / M / 1 Queue **5**

   (c) Write a note on power spectral density and it's properties. **5**

ME (EXTC) SEM I (Rev) May 2013
DSP & its applications 2015/13

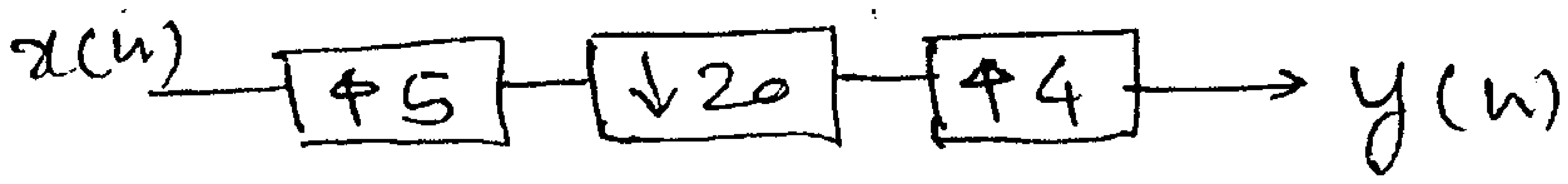
28 : 1st half.13-AM(z)

Con. 8743-13. **BB-6994**

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **three** questions from the **remaining**.
(3) Assume suitable **data** wherever required but **justify** the **same**.

1. (a) Obtain the expression for output y(n) in terms of x(n) for the multirate system shown below : 5



(b) What are advantages of DSP processors in relation to general purpose processors ? 5
(c) Explain zero input limit cycles and overflow limit cycles. 5
(d) Obtain polyphase decomposition of IIR system with transfer functions 5

$$H(z)=\frac{1-4z^{-1}}{1+5z^{-1}}$$

2. (a) Determine DFT (8 point) for a continious time signal $x(t) = \sin(2\pi ft)$ with f = 50 Hz using DIF – FFT algorithm. 10
(b) How can energy density spectrum be determined for a discrete time signal ? 10

3. (a) Design a Butterworth Low Pass Filter for following specifications :— 10
(i) Pass band gain required = 0·9
(ii) Frequency upto which passband gain must remain more or less steady = 100 rad / sec
(iii) Gain in attenuation band = 0·4
(iv) Frequency from which attenuation must start = 200 rad / sec.
(b) Determine the digital transfer function H(z) using impulse invariant transformation technique for analog system function 10

$$H(s)=\frac{1}{(s+0\cdot5)\left(s^2+0\cdot5s+2\right)}$$

4. (a) Draw and explain architecture of sixth generation TMS 320 C6X processor. 10
(b) Explain biomedical applications of DSP. 10

[TURN OVER

5. (a) Discuss the applications of DSP in speech processing. 5
(b) How can sampling rate be converted by a rational factor M/L. 5
(c) The output of A/D convertor is applied to a digital filter with system function 10

$$H(z) = \frac{0 \cdot 5z}{z - 0 \cdot 5}$$

Find the output noise power from digital filter, when the input signal is quantized to have eight bits.

6. (a) The desired response of low pass filter is — 10

$$Hd\left(e^{jw}\right) = \begin{cases} e^{-j3w} & -\frac{3\pi}{4} \le w \le \frac{3\pi}{4} \\ 0 & \end{cases}$$

Determine $H(e^{jw})$ for M = 7 using Hamming window.
(b) Determine the frequency resolution of Bartlett Welch and Blackman Tukey methods of power spectrum estimates for a quality factor Q = 10. Assume that overlap in Welch method is 50% and length of sample sequence is 1000. 10