M.E./EXTC/SEM I (CBCS) NOV/DEC '16

STATISTICAL SIGNAL PROCESSING

QP Code : 841901

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

N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any three questions from the remaining five questions.
(3) Assume **suitable data** if needed and state it clearly.
(4) Figures to right indicate full marks.

1. Solve **any five :**
   (a) Define and explain the terms "Basis of vector space" and "subspace of a vector space". **4**
   (b) Two statistically independent random variables X and Y have mean values 2 and 4 respectively. If W = 3X- Y, Find the mean and variance of random variable W. **4**
   (c) State the important properties of General correlation matrices. **4**
   (d) Describe application of DKLT (Discrete Karhunen-Loeve Transform) in data compression. **4**
   (e) State the CRLB theorem. **4**
   (f) Give assumptions about the state variable system used in Kalman filtering. **4**

2. (a) Check whether the following vectors are independent $[1\ 3\ 2]^T$, $[2\ 1\ 3]^T$ $[3\ 2\ 1]^T$. **6**
   (b) Explain the four fundamental subspaces of linear operator. **6**
   (c) Explain Gram-Schmidt orthogonalization procedure. **8**

3. (a) Let x(n) =A+w(n) n=0,1...., N-1 where w(n) is WGN with zero mean and variance σ^2. Determine the CRLB for A. **10**
   (b) Consider a linear transformation $\mathbf{y} = \mathbf{A}^T\mathbf{x}$. The mean vector $\mu_x = [2\ 1]^T$, Find the mean vector of **y** if **A** is 2x2 identity matrix. **4**
   (c) State and explain central limit theorem (CLT). **6**

4. (a) Explain the concept of Innovations representation. What is whitening process. **6**
   (b) Define and explain following **4**
      (i) Bias of Estimator
      (ii) Efficient estimator

[TURN OVER]

(c) Compare and contrast orthogonal and triangular decompositions for zero mean random vectors. **10**

5. (a) What is Kalman filtering? Discuss in detail. **10**

(b) A random process is defined as $X(n) = A \cos(2\pi n)$, where A is a Gaussian random variable with zero mean and variance σ^2. **10**

(i) Determine the density function of X(0) and X(1).

(ii) Is X(n) a stationary process in any sense?

6. (a) A causal LTI system is described by the difference equation **10**

$y(n) = \frac{1}{2} y(n-1) + x(n) + x(n-1)$ is driven by zero mean WSS process with autocorrelation $R_{xx}(\ell) = 2\,\delta(n)$.

(a) Determine the cross power spectral density between input and output

(b) Power spectral density at the output

(b) It is desired to estimate the value of a DC level A in WGN or **10**
$x(n) = A + w(n)$, $n = 0, 1, \ldots, N-1$.
where w(n) is zero mean and uncorrelated and each sample has variance $\sigma^2 = 1$. Consider following estimator

$$\hat{A} = \frac{X(0) + X(N-1)}{2}$$

Find the mean of the estimator. Is the estimator biased? Compute the variance of the estimator.

M.E./ SEM I (CBCS) / EXTC NOV/DEC 16

OPTICAL COMM. NETWORK

QP Code : 64269

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions out of the remaining **five** questions.
(3) Assume suitable data whenever necessary and justify the same.

1. (a) Define path, line and section used in the SONET/SDH frame. **20**
(b) How the signal get degraded in optical fiber communication? Explain in brief.
(c) Compare stimulated Raman scattering and stimulated Brillouin scattering.
(d) Explain in brief the Dimensioning wavelength network.
(e) What is unidirectional and bidirectional WDM system?

2. (a) Explain Self phase and Cross phase modulation. What are Kerr nonlinearities? **10**
(b) Explain Dispersion Compensating fibers in detail. **10**

3. (a) Explain four wave mixing in detail. **10**
Consider 75 km link of dispersion shifted single mode fiber carrying two wavelengths. At 1540.0 nm and 1540.5 nm, then calculate new frequency generated due to Four wave mixing (FWM).
(b) List the properties of Solitons, and explain Loss managed Solitons in detail. **10**

4. (a) What is optical transport network (OTN)? Explain OTN frame structure in detail. **10**
(b) Explain resonant cavity enhancement (RCE) Photo detector in detail. **10**

5. (a) What is optical amplifier? Compare Semiconductor optical amplifier, Raman amplifier and Erbium doped amplifier. **10**
(b) List and explain different Lightpath topologies, and write the equations for number of Wavelength needed to support the traffic and router ports required. **10**

6. Write short notes on: **20**
(a) Four RWA algorithms
(b) Metro Network
(c) Optical Cross connect
(d) Optical Switching

ME / EXTC / Sem-I (CBCS) / Modern Digital Signal Processing Application / Nov-16

Q. P. Code : 842100

Total Marks: 80

(3 Hours)

N.B. : (1) Questions No.**1** is **compulsory**.
(2) Solve any three questions out of remaining **five** questions
(3) Draw neat labeled diagram whenever necessary
(4) Assume suitable data if necessary

Q.1	Solve any four out of five	
	i) Explain Power spectral density	5
	ii) What is Harr Wavelet? Write its properties.	5
	iii) What are Time Domain operations in Musical Sound Processing	5
	iv) Write any four characteristics of adaptive system	5
	v) Compare Bartlett ,Welch and Blackman-Tukey methods of Power Spectrum Estimation	5
Q.2	a) Explain Yule-Walker method for AR model Parameters.	10
	b) What is QRS complex in ECG and Explain any method for QRS complex detection.	10
Q.3	a) What are the time and frequency domain ECG parameters? Explain with the ECG waveforms.	08
	b) Explain with neat block diagram the Adaptive Echo Cancellation.	12
Q.4	a) Derive LMS Algorithm and mention its limitations	10
	b) Explain Application of Wavelet Transform for Signal Denoising.	10
Q.5	a) How Occular Artifacts are removed from Human EEG? Explain with neat diagram.	10
	b) Explain the Three Basic Filters used in Equalization of Digital Audio Signals.	10
Q.6	a) What is Short Time Fourier Transform and explain how it is suitable for analysis of Speech Signals.	08
	b) Explain with block diagram the Adaptive Linear Combiner.	06
	c) Compare Short Time Fourier Transform and Wavelet Transform	06

ME/EXTC/Sem-I(CBCS)/Next Generation Network/Nov-16

Q.P. Code : 842201

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

N.B. : (1) Question **No.1** is **Compulsory.**
(2) Solve **any three** from the remaining questions.

1. Attempt the following **20**
   (a) Explain the MPLS Services and Component.
   (b) Give overview of VPN from Layer 2 and 3 prospective.
   (c) Explain QoE in NGN
   (d) Explain the concept of SDR and Cognitive Radio

2. (a) Classify the Wireline NG Technologies and Explain any one in detail. **10**
   (b) Draw the TISPAN Architecture and explain in detail. **10**

3. (a) What is VOIP ? Compare VOIP V4 and V6 in detail. **10**
   (b) Explain name, numbering, and addressing schemes in NGN. **10**

4. (a) Explain migration of PSTN system to NGN. **10**
   (b) Explain Fixed Mobile Convergence in detail. **10**

5. (a) Explain service Convergence in NGN. **10**
   (b) Explain transition of IP networks to NGN. **10**

6. Write **any four** Short Notes on Followings: **20**
   (a) AAA Schemes in NGN
   (b) FTTH Concept
   (c) IPTV
   (d) NGN Evolution
   (e) NGN Drivers

ME-Sem-I-(CBCS)-INST&CONT, EXTC, INFT- NOV-16
Management Information System

Q. P. Code : 855301

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

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

(2) Attempt any 3 questions out of rest.

(3) Figure to the right indicate full marks.

(4) All questions carry equal marks.

1. College wants to design database for examination system.

   a) Design tables with assuming suitable attributes and normalize the database. **5**

   b) Define primary key, foreign key with its importance in database design. List Primary and foreign key in each table of above tables. **5**

   c) Draw Star schema and Snowflake schema for above design. **5**

   d) Explain difference between star schema and snowflake schema with purpose of normalization. **5**

2. a) Explain Several ways in which IT impacts employees at work. Also explain how IT might change manager's job. **10**

   b) Explain E-Commerce with its various types. **10**

3. a) Explain Characteristics of data warehouse. Differentiate between data warehouse and data marts. **10**

   b) Explain Customer relationship Management with its various types. **10**

4. a) Define Big Data. Explain various characteristics and issues in Big Data. **10**

   b) Explain various Business intelligence Applications for presenting Results. **10**

5. a) Explain traditional system development life cycle. **10**

   b) Explain various threats to information system. **10**

6. Write short notes on any two **20**

   a) Enterprise Resource planning

   b) Pervasive Computing

   c) Cloud computing model
