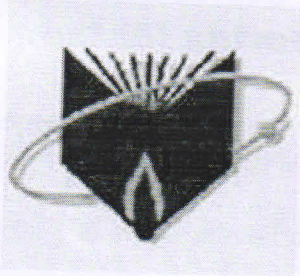

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COLLEGE OF ENGINEERING AND TECHNOLOGY ,VIJAYPUR.

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QUESTION PAPERS

I & II SEM M.TECH.

ELECTRONICS & COMMUNICATION

DEC.2017/JAN. 2018

INDEX

1 Sem. M.Tech. EC

CBCS Scheme

USN | | | | | | | | | | |

16/17ECS12

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Antenna Theory and Design

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Using Maxwell's equations, explain how radiation and reception of electromagnetic waves takes place. **(08 Marks)**

b. Deduce the expressions for the field of an ideal dipole. Also determine the radiation impedance for the same. **(08 Marks)**

OR

2 a. Deduce the expression for directivity of uniformly excited equally spaced linear array. **(08 Marks)**

b. Discuss the effects of mutual coupling in arrays, also evaluate the array pattern including the same. **(08 Marks)**

Module-2

3 a. i) Derive the expression for the array factor for two isotropic point sources with identical amplitude and 90° out of phase with $d = \frac{\lambda}{4}$. **(04 Marks)**

ii) Illustrate the pattern and deduce the array factor for two isotropic point sources with identical amplitude and phase currents spaced one half wavelength apart. **(04 Marks)**

b. Explain line source shaped beam synthesis method. Deduce mathematical formula of Fourier transform method. **(08 Marks)**

OR

4 a. Illustrate Dolph-Chebyshev linear array for a 5 element, $\frac{\lambda}{2}$ spaced broad side array with -20 dB side lobes. **(08 Marks)**

b. Explain the linear array shaped beam synthesis models and compare the shaped beam synthesis methods. **(08 Marks)**

Module-3

5 a. Explain the construction, basic characteristics and feeding methods of a μ strip (micro strip) antenna. List major operational disadvantages for the same. **(10 Marks)**

b. Explain the principle of operation of a log periodic antenna. **(06 Marks)**

OR

6 a. A square microstrip patch with L = W = 4.02 cm is printed on a 0.157 cm thick substrate of $\epsilon_r = 2.35$. Calculate:
i) The resonant frequency
ii) Input impedance
iii) Bandwidth **(06 Marks)**

b. Explain the operation of a helical antenna with its modes. **(10 Marks)**

Module-4

7 a. Design an axisymmetry reflector to operate at 10 GHz with 1° help power beam width for high gain, narrow beam and low cross polarization. **(10 Marks)**

b. Discuss the various factors of aperture efficiency considered for gain calculations for reflector antenna. **(06 Marks)**

OR

8 a. Describe feed antenna for reflector. **(08 Marks)**

b. Explain the principles of operation of parabolic. Describe the basic characteristics of cassegrain feed system. **(08 Marks)**

Module-5

9 a. Derive Pocklington's integral equation. **(08 Marks)**

b. Establish the analogy between Kirchoff's network equation and integral equations. **(08 Marks)**

OR

10 a. Bring out the advantages of FD-TD techniques used in CEM. Explain the method of weighted residuals with respect to CEM. **(08 Marks)**

b. Illustrate the wedge diffraction theory to destructive field in the forward scattering direction around the shadow boundary. **(08 Marks)**

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CBCS Scheme

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16/17ESP/ECS/EVE/EIE/ELD13

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Advanced Embedded System

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the various purposes of embedded system in detail with illustrative examples. **(08 Marks)**

b. What is difference between RISC and CISC processors? Give an example for each. **(04 Marks)**

c. What is sensor and actuator? Explain how the LED and opto coupler are used as an I/O subsystem in embedded system. **(04 Marks)**

OR

2 a. Explain the different on-board communication interfaces in brief. **(10 Marks)**

b. Mention some of the important characteristics of embedded system and write about the different operational quality attributes. **(06 Marks)**

Module-2

3 a. Describe the assembly language to machine language conversion process and high level language to machine language conversion process with neat diagram. **(10 Marks)**

b. What are the commonly used computational models in embedded system and explain any two model with example. **(06 Marks)**

OR

4 a. Explain the out of circuit programming and in system programming used in the integration of hardware and firmware. **(10 Marks)**

b. Write short notes on simulators, emulators and debuggers. Also mention the advantages and limitations of simulator based debugging. **(06 Marks)**

Module-3

5 a. Discuss the relationship between the thumb instruction set in thumb-2 technology and the traditional thumb. Mention the various applications of Cortex-M3 processor. **(06 Marks)**

b. Construct ARM Cortex-M3 processor architecture and explain its various units. **(10 Marks)**

OR

6 a. Give detailed description about general purpose registers in the Cortex-M3 processor. **(08 Marks)**

b. Explain how stack memory operations are carried out automatically in the Cortex-M3 processor and discuss two stack model also. **(08 Marks)**

Module-4

7 a. Construct CORTEX-M3 predefined memory map and explain with complete details. **(12 Marks)**

b. Explain briefly about basic syntax and use of suffixes in assembler language. **(04 Marks)**

OR

8 a. Describe the pipeline architecture and bus interfaces based on the implementation of CORTEX-M3 processor. **(12 Marks)**

b. Discuss briefly about memory system features in CORTEX-M3 system. **(04 Marks)**

Module-5

9 a. How SYSTIC TIMER is controlled by four registers? Explain with necessary tables. **(08 Marks)**

b. Write the salient features of NVIC. **(08 Marks)**

OR

10 Explain the details about background, standardization, organization and benefit of CMSIS with neat diagram. **(16 Marks)**

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CBCS Scheme

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16/17ECS14

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Advanced Digital Communications

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 With neat block diagram, explain about the Quadrative Amplitude Modulation (QAM) and also write the probability of bit error of QAM. **(16 Marks)**

OR

2 Describe about the QPSK and offset QPSK signaling with relevant diagram. **(16 Marks)**

Module-2

3 Draw the optimum AWGN receiver and explain the working of that receiver. **(16 Marks)**

OR

4 Explain about the probability of error for binary modulation with relevant expressions. **(16 Marks)**

Module-3

5 Explain about the multicarrier communications for an FFT based multicarrier system. **(16 Marks)**

OR

6 Describe about the signal parameter estimation with relevant equations. **(16 Marks)**

Module-4

7 With neat block diagram, explain about the optimum receiver for an AWGN channel with ISI. **(16 Marks)**

OR

8 Explain different types of equalization techniques. Compare the equalization techniques. **(16 Marks)**

Module-5

9 Describe about the CDMA system based on FH spread spectrum signals. **(16 Marks)**

OR

10 Explain about the synchronization of spread spectrum signals. **(16 Marks)**

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CBCS Scheme

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16/17ECS/ESP151

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Advanced Computer Networks

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. What do you mean by Networking Principles? Briefly explain them. **(08 Marks)**

b. What is Multiplexing? Explain TDM and Statistical Multiplexing with necessary diagrams. **(08 Marks)**

OR

2 a. What are choices and constraints? Explain performance metric in detail. **(08 Marks)**

b. Briefly explain the following:
i) CSMA and its variants ii) Token passing and its variants. **(08 Marks)**

Module-2

3 a. Explain IEEE 802.3 MAC Layer. **(06 Marks)**

b. What is Packet Switching? Explain three generations of Packet Switching. **(10 Marks)**

OR

4 a. Briefly explain the requirements of scheduling discipline. **(08 Marks)**

b. Briefly explain the fundamental choices of scheduling. **(08 Marks)**

Module-3

5 a. Briefly explain the following:
i) ATM signaling ii) ATM adaptation layer **(10 Marks)**

b. Explain SONET frame structure. **(06 Marks)**

OR

6 a. Explain TCP header format. **(10 Marks)**

b. Explain ICMP Packet header. **(06 Marks)**

Module-4

7 a. What are traffic models? Briefly explain them. **(08 Marks)**

b. What is traffic scheduling? Explain hierarchical link sharing. **(08 Marks)**

OR

8 a. What is Routing Optimization in datagram Network? Explain Bellman-Ford Algorithm. **(10 Marks)**

b. Briefly explain objectives and methods of control of control networks. **(06 Marks)**

Module-5

9 a. Briefly explain DEC bit flow control of closed loop flow control. **(10 Marks)**

b. Explain the Linear Bounded Arrival processes of the open-loop control. **(06 Marks)**

OR

10 a. Give comparison of closed loop scheme. **(08 Marks)**

b. Explain ATM forum End-to-End rate control scheme. **(08 Marks)**

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14ECS13

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018

Probability and Random Process

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Define collectively exhaustive events, equally likely events and mutually exclusive events with one example each. **(07 Marks)**

b. What are the three axioms of probability? A bag contains 4 red and 6 blue balls. Two balls are drawn at random from the bag. Find the probability that both of them are red, if
i) The balls are drawn together
ii) The balls are drawn one after the other without replacement.
iii) The balls are drawn one after the other with replacement. **(07 Marks)**

c. State and prove extended addition principle theorem. **(06 Marks)**

2 a. State and prove Baye's theorem. **(06 Marks)**

b. Give the PMF for the following random variables:
i) Bernoulli's random variable
ii) Binomial random variable
iii) Geometric random variable
iv) Poisson's random variable. **(07 Marks)**

c. The number of telephone lines busy at an instant of time is a binomial variate with probability 0.1 that a line is busy if 10 lines are chosen at random, what is probability that:
i) No line is busy
ii) All lines are busy
iii) Atleast one line is busy
iv) Atmost two lines are busy. **(07 Marks)**

3 a. What is CDF (cumulative density function)? What are properties of CDF? If given CDF is $F_X(x) = (1 - e^{-x})u(x)$ find $P(3 < x < 7)$ and $P(x > 5 / x < 7)$. **(07 Marks)**

b. A Gaussian R.V has PDF of the form $f_X(x) = \frac{1}{\sqrt{8\pi}} e^{\left(-\frac{(x+3)^2}{8}\right)}$. Write each of the following probability in terms of Q function: (i) $p(x > 4)$; (ii) $p(|x + 3| < 2)$; (iii) $p(x < -3)$. **(07 Marks)**

c. Give the expression fro PDF and CDF for the following function with atleast one application: (i) Erlang R.V; (ii) Chi-Squared R.V; (iii) Rayleigh R.V. **(06 Marks)**

4 a. Obtain E[X] and $E[X^2]$ for binomial R.V $P_X(K) = nC_K P^K (1-P)^{n-K}$. **(07 Marks)**

b. Define for continuous R.V:
i) N^{th} central moment
ii) Coefficient of skewness
iii) Coefficient of Kurtosis. **(06 Marks)**

c. For a Laplace random variable whose PDF is given by $f(x) = \frac{1}{2b} e^{-\frac{|x|}{b}}$, find the following:
i) Characteristic function $\phi(\omega)$
ii) A general expression for K^{th} moment of x. **(07 Marks)**

5 a. Prove that, for any random variable, the characteristic function is differentiable at $\omega = 0$ is $E[x] = -j\frac{d}{d\omega}\phi_X(\omega)|_{\omega=0}$. **(06 Marks)**

b. Find the probability generating function for a geometric R.V. with $P_X(K) = (1-P)P^K$. **(07 Marks)**

c. Find the moment generating function for Erlang R.V. along with K^{th} moment $f(x) = \frac{x^{n-1}e^{-x}u(x)}{(n-1)!}$. Also find mean and variance. **(07 Marks)**

6 a. A pair of R.V has a joint PDF given by $f_{x,y}(x,y) = \frac{1}{2\pi\sqrt{3}}e^{-\frac{(x^2+2xy+4y^2)}{6}}$, find the marginal PDF of $f_x(x)$ and $f_y(y)$. **(10 Marks)**

b. A pair of R.V has joint PDF given by $f_{x,y}(x,y) = \frac{2abc}{(ax+by+c)^3}u(x)u(y)$ for some positive constants a, b and c, obtain conditional distribution $f_{x/y}(x/y)$ and $f_{y/x}(y/x)$. **(10 Marks)**

7 a. Define joint Gaussian PDF. Derive an expression for two dimensional joint Gaussian PDF. **(10 Marks)**

b. Let $X = [x_1, x_2, x_3]^T$ represents a 3-dimensional vector of R.V is uniformly distributed over the unit sphere $f_x(x) = \begin{cases} c & \|x\| \le 1 \\ 0 & \|x\| > 1 \end{cases}$. Find: (i) Constant C, (ii) $f_{X_1,X_2}(x_1,x_2)$, (iii) $f_{X_1/X_2,X_3}(x_1/x_2,x_3)$. **(10 Marks)**

8 a. A random process X(t) has the following member functions $x_1(t) = -2\cos t$, $x_2(t) = -2\sin t$, $x_3(t) = 2(\cos t + \sin t)$, $x_4(t) = (\cos t - \sin t)$ and $x_5(t) = (\sin t - \cos t)$.

i) Find the mean function $\mu_x(t)$

ii) Find the auto correlation function $R_{xx}(t_1,t_2)$. **(10 Marks)**

b. Define:

i) Stochastic sense stationary (SSS)

ii) Wide sense stationary (WSS) random process if a random process y(t) by modulating a carrier with another random process x(t) is let $y(t) = x(t)\cos(\omega_c t + \Theta)$ where Θ is uniformly distributed over $(0, 2\pi)$ and independent of x(t). Find whether the y(t) is SSS or WSS process. **(10 Marks)**

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CBCS Scheme

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16ECS/EIE/ELD21

Second Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Advanced DSP

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Explain Decimation and Interpolation in multirate signal processing. **(05 Marks)**

b. Show that up sampler and down sampler are time variant system. **(04 Marks)**

c. Derive an expression for spectrum of the decimetor output sequence y(m). **(07 Marks)**

OR

2 a. Prove the equivalence of the two decimeter and interpolator configuration shown in fig. Q2(a). **(06 Marks)**

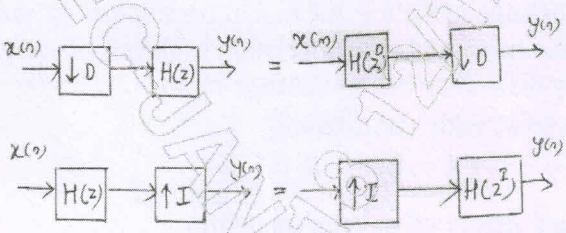

Fig.Q2(a)

b. The frequency response of the input signal x(n) as shown in fig.Q2(b). If this signal is passed through down sampler D = 3 , determine the spectrum of the sampler output. **(05 Marks)**

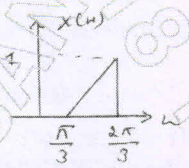

Fig.Q2(b)

c. Obtain the polyphase decomposition of the IIR system with transfer function $H(z) = \frac{1-4z^{-1}}{1+5z^{-1}}$. **(05 Marks)**

Module-2

3 a. Define the statistical characteristic , mean , auto correlation , auto covariance function of random process X(t). **(06 Marks)**

b. Let x(n) be an ARMA (p, q) process given by $x(n) = -\sum_{k=1}^{p} a_k\, x(n-k) + \sum_{k=0}^{q} b_k\, w(n-k)$, where w(n) is a zero mean white noise process with variance σ_w^2 . Derive an expression for the auto correlation sequence $r_{xx}(m)$ for all m of innovative random process x(n). **(10 Marks)**

OR

4 a. The power spectrum of an AR process {x(n)} is given as $\Gamma_{xx}(w) = \frac{\sigma_w^2}{|A(w)|^2} = \frac{25}{\left|1 - e^{-jw} + \frac{j}{2}e^{-j2w}\right|^2}$, where σ_w^2 is the variance of the input sequence w(n).

i) Determine the difference equation for the AR process when the excitation is white noise.

ii) Determine the system function for the whitening filter. **(08 Marks)**

b. Starting from the auto correlation matrix, explain Levinson – Durbin algorithm to determine prediction coefficient. **(08 Marks)**

Module-3

5 a. With block diagram, explain adaptive channel equalizer to reduce the distortion in transmission channel. **(08 Marks)**

b. Explain the Adaptive filtering method in Linear Predictive Coding (LPC) to encode speech signal. **(08 Marks)**

OR

6 a. Show that optimum FIR filter coefficient h_{opt} reduce the mean square error in adaptive filtering. **(08 Marks)**

b. Explain in detail, the steepest descent LMS algorithm. **(08 Marks)**

Module-4

7 a. What is the relationship between autocorrelation and power density spectrum? **(06 Marks)**

b. Explain Power spectral estimation using Barlett method. **(10 Marks)**

OR

8 a. Explain Burg method for the AR model parameters estimation. **(08 Marks)**

b. Determine the mean and autocorrelation of the sequence x(n) generated by MA(2) process described by difference equation $x(n) = w(n) - 2w(n-1) + w(n-2)$. Where w(n) is a zero mean white noise with variance σ_w^2. **(08 Marks)**

Module-5

9 a. Give the brief history of wavelet transform. **(08 Marks)**

b. Briefly explain each application of wavelet transform. **(08 Marks)**

OR

10 a. Let $\phi(t)$ be the Harr scaling function defined as

$\phi(t) = 1 \quad 0 \le t \le 1$

$= 0 \quad$ otherwise

Sketch the translation of $\phi(t-1)$ and $\phi(t-2)$. **(08 Marks)**

b. The signal in space V_1 as shown in fig. Q10(b). Express V_1 in terms of V_0 and W_0. Where V_0 is the bases of Harr scaling function $\phi(t)$ and W_0 is the bases of Harr wavelet function $\Psi(t)$. **(08 Marks)**

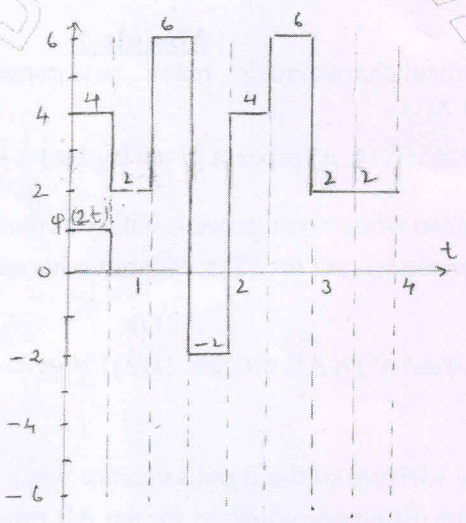

Fig.Q10(b)

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CBCS Scheme

USN | | | | | | | | | | |

16ECS/ELD22

Second Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Error Control Coding

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Define Group and Field. **(05 Marks)**

b. Prove with an example, an irreducible polynomial over GF (2) of degree 'm' diveides $X^{2^m} - 1_{+1}$. **(05 Marks)**

c. For joint probability matrix given in Fig. Q1(c), find H(x), H(y), H(x/y), H(y/x) and H(x,y)

$$Jpm = \begin{bmatrix} 0.25 & 0 & 0 & 0 \\ 0.1 & 0.3 & 0 & 0 \\ 0 & 0.05 & 0.1 & 0 \\ 0 & 0 & 0.05 & 0.1 \\ 0 & 0 & 0.05 & 0 \end{bmatrix}$$

Fig Q1(c) **(06 Marks)**

OR

2 a. Construct a table for GF(2^4) based on primitive polynomial $P(x) = 1 + x + x^4$. List the power polynomial, n-tuple representation of each element. **(08 Marks)**

b. Discuss the properties of mutual information. **(08 Marks)**

Module-2

3 a. For a (7, 4) linear block code the parity matrix is given by

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

i) Write all possible code vector
ii) Draw the encoder circuit
iii) Draw syndrome calculation circuit. **(10 Marks)**

b. Define: i) Single parity check codes ii) Repetition codes iii) Self qual codes. **(06 Marks)**

OR

4 a. For a systematic (6, 3) Linear block code, the parity matrix [P] is

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

Construct standard array table for the code words.
If the received bit pattern r = [1 0 1 1 0 1], determine syndrome, correctable error pattern and corrected code vector for a single bit error. **(10 Marks)**

b. Explain the Rud Muller codes. **(06 Marks)**

Module-3

5 a. For a (7, 4) cyclic code with generator polynomial $g(x) = 1 + x + x^3$, find the code vector for messages i) 0010 ii) 0100 iii) 1001 iv) 1101 v) 1111 in systematic and non-systematic form. **(10 Marks)**

b. Explain the steps involved in encoding of (n, k) cyclic code using parity check polynomial. **(06 Marks)**

OR

6 a. A (15, 5) linear cyclic code has a generator polynomial $g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$.

i) Draw the block diagram of encoder

ii) Find the code polynomial for message polynomial $D(x) = 1 + x^2 + x^4$. **(10 Marks)**

b. Explain Error Trapping decoder. **(06 Marks)**

Module-4

7 a. Explain Binary primitive BCH codes. **(08 Marks)**

b. Draw the block diagram of a Galois field adder and explain it. **(08 Marks)**

OR

8 a. Draw the block diagram of a General type – II one step majority logic decoder and explain it. **(08 Marks)**

b. Discuss error correction procedure of a general type – II L – step majority logic decoder. **(08 Marks)**

Module-5

9 a. A rate 2/3 non systematic feed forward convolutional encoder shown in Fig. Q9(a).

i) Find generator polynomials

ii) Find the code wards if $V^1(D) = 1 + D^2$ and $V^2(D) = 1 + D$. **(08 Marks)**

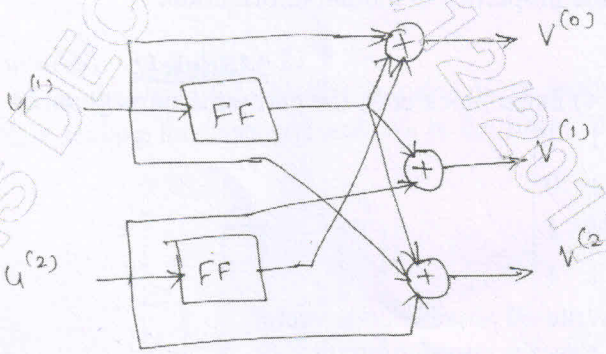

Fig. Q9(a)

b. Discuss the distance properties of convolutional codes. **(08 Marks)**

OR

10 a. For (3, 1, 2) Non-systematic feed forward encoder with $G(D) = [1 + D, 1 + D^2, 1 + D + D^2]$ and information sequence of length = 5. The received sequence is r = [110, 110, 110, 111, 010, 101, 101].

Find the message sequence using viterbi decoding algorithm. **(10 Marks)**

b. Explain sequential decoding algorithm. **(06 Marks)**

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CBCS Scheme

USN | | | | | | | | | | 16ECS23

Second Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Wireless Communication

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Describe the free space electric field for moving antenna and fixed receive antennas. **(08 Marks)**

b. Show that the multi-path effects of the wireless channel can be modeled as a linear time varying system. **(08 Marks)**

OR

2 a. Draw and explain the system diagram form the base band transmitted symbol x[m] to the base band sampled received signal y[m]. **(08 Marks)**

b. Explain: i) Doppler spread and coherence time ii) Rayleigh and Rician fading. **(08 Marks)**

Module-2

3 a. Derive the detection in a Rayleigh fading channel with respect to non – coherent. Assume a flat fading model with filter taps **(10 Marks)**

b. Explain time diversity with interleaved diagram. **(06 Marks)**

OR

4 a. With a neat block diagram, explain basic elements of a direct sequence spread spectrum (DSSS) system. **(10 Marks)**

b. Write short notes on Receive diversity. **(06 Marks)**

Module-3

5 a. With a neat diagram, explain received signal strength indication controlled driven selection diversity. **(08 Marks)**

b. Explain angle diversity and polarization diversity. **(08 Marks)**

OR

6 a. With a neat diagram explain maximum ratio combining and equal gain combining in combining diversity. **(10 Marks)**

b. Explain transmit diversity. **(06 Marks)**

Module-4

7 a. With relevant expressions, explain continuous time AWGN channels. **(08 Marks)**

b. Explain slow fading channel in capacity of fading channels. **(08 Marks)**

OR

8 a. Explain the following with reference to linear time – invariant Gaussian channels :
   i) Single input multiple output channel
   ii) Multiple input single output channel **(10 Marks)**

   b. Describe frequency selective channel. **(06 Marks)**

Module-5

9 a. Discuss space diversity and systems based on space diversity. **(08 Marks)**

   b. With a neat block diagram, explain spatial multiplexing. **(08 Marks)**

OR

10 a. Explain Alamouti's code in space time block code (STBC) with relevant equations. **(08 Marks)**

   b. Explain MIMO – OFDM transmitter and receiver with block diagram. **(08 Marks)**

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CBCS Scheme

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16ELD/ECS252

Second Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Multimedia over Communication Links

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. What is the limiting factor associated with movie/video on demand? Explain how this effect is reduced with N-MOD. **(06 Marks)**

b. Differentiate continuous mode media and block mode media. **(04 Marks)**

c. With the aid of diagrams, explain the following operational modes of multipoint conferencing (i) centralized, (ii) decentralized, (iii) hybrid. **(06 Marks)**

OR

2 a. Explain Raster scan principle with neat diagram. **(08 Marks)**

b. With the aid of diagrams, explain the data network and meanings of the following terms relating to a data network:
i) Open system interconnection
ii) Intranet
iii) ISP **(08 Marks)**

Module-2

3 a. Assuming CD-DA standard is being used, derive:
i) The storage capacity of a CD-ROM to store a 60 minute multimedia title.
ii) The time to transmit 40 second portion of the title using a transmission channel of nit rate: (1) 64 kbps, (2) 1.5 mbps. **(06 Marks)**

b. Explain QOS parameters with respect to ATM networks and also explain VC, VP and VCC with neat diagram. **(10 Marks)**

OR

4 a. Derive the bit rate and memory requirements to store each frame that result from the digitization of both a 525 line and a 625 line system assuming a 4:2:0 format. Also find the total memory required to store a 1.5 hour movie/video. **(08 Marks)**

b. What is RTP? Explain RSVP architecture of IP networking with a neat diagram. **(08 Marks)**

Module-3

5 a. Explain the terms relevant to psychoacoustic fundamentals:
i) Absolute threshold of hearing
ii) Temporal masking
iii) Simultaneous masking **(09 Marks)**

b. With a neat diagram, explain optimum coding in the frequency domain. **(07 Marks)**

OR

6 a. Explain the operation of perceptual transform coder with a neat diagram. **(08 Marks)**

b. With a neat diagram, explain digital audio signal processing. Which are the different approaches used to reduce storage requirements of digital image? **(08 Marks)**

Module-4

7 a. What is MPEG standard? Explain basic structure of the MPEG-1 audio encoder with a diagram. **(08 Marks)**

b. Explain the following:
i) Intra coded pictures
ii) Predictive coded pictures
iii) Bidirectional coded picture
iv) Macro block **(08 Marks)**

OR

8 a. Explain different level of hierarchy based on the different transport streams and transport packet header with reference to MPEG-2. **(08 Marks)**

b. With a block diagram, explain basic DPCM/DCT encoder and decoder structure. **(08 Marks)**

Module-5

9 a. With a neat block diagram, explain video communication system. List the different error-resilience techniques. **(09 Marks)**

b. Explain conceptual structure of a layered video with a diagram,. Explain rate distortion characteristics curve. **(07 Marks)**

OR

10 a. Explain video-streaming architecture with a neat diagram. **(08 Marks)**

b. With a block diagram, explain packing/error concealment scheme of MPEG video. **(08 Marks)**

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14ECS23

Second Semester M.Tech. Degree Examination, Dec.2017/Jan.2018
Modern DSP

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Consider the analog signal $x_a(t) = 3\cos 100\pi t$
   i) Determine the minimum sampling rate required to avoid aliasing
   ii) Suppose that the signal is sampled at the rate $F_s = 200$ Hz. What is the discrete time signal obtained after sampling
   iii) Sample the signal $x_a(t)$ at the rate 75Hz. What is the discrete time signal obtained after sampling?
   iv) What is the frequency $0 < F\ M\ F_s/2$ if a sinusoid that yields samples identical to those obtained in part (iii). **(10 Marks)**

   b. Explain the concept of frequency in continuous time and discrete time sinusoidal signal. **(10 Marks)**

2 a. By means of DFT and 1DFT, determine the response of the FIR filter with impulse response $h(n) = \{\underset{\uparrow}{1}, 2, 3\}$ to the 1/p sequence $x(n) = \{\underset{\uparrow}{1}, 2, 2, 1\}$ use 8 – point DFT. **(15 Marks)**

   b. State and prove that multiplication of the two DFT sequences are equivalent to the circular convolution of two sequences n time domain. **(05 Marks)**

3 a. Find the linear convolution using overlap add method for the given sequence.
   $x[n] = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$
   $h[n] = \{1, 2, 3\}$. Use 4 – point circular convolution. **(14 Marks)**

   b. Let $x_p(n)$ be a periodic sequence with fundamental period N. Consider the following DFT's.

$$x_p(n) \xleftarrow[N]{DFT} x_1(k)$$

$$x_p(n) \xleftarrow[3N]{DFT} x_3(k)$$

   What is the relationship between $x_1(k)$ and $x_3(k)$. **(06 Marks)**

4 a. Determine the coefficient of h(n) of a linear phase FIR filter of length M =15, which has a symmetric unit sample response and frequency response that statistics the condition :

$$H_r\frac{(2\pi k)}{15} = \begin{cases} 1 & k = 0,1,2,3 \\ 0 & k = 4,5,6,7 \end{cases}.$$ **(08 Marks)**

   b. List the design procedure using windowing technique. What is aibbs phenomenon? How it can be reduced? **(08 Marks)**

   c. Compare IIR and FIR filter. **(04 Marks)**

5 a. Write the frequency transformation in : i) analog domain ii) digital domain. **(10 Marks)**

   b. Explain the mapping of analog filter to a digital filter using impulse invariance method. Also state the limitations of this method. **(10 Marks)**

6 a. Illustrate sampling rate conversion by a factor I/O. **(10 Marks)**

   b. Explain the design and implementation of digital transmultiplexers. **(10 Marks)**

7 a. With neat block diagram and equation, explain M – channel QMF bank. How it eliminates aliasing. Also explain the perfect reconstruction of M – channel QMF bank. **(10 Marks)**

b. Explain how an analog filter is mapped on to a digital filter using backward difference method. Using this technique convert the analog filter with system function $H(s) = \frac{1}{(s+2)}$ into a digital filter. **(10 Marks)**

8 a. Explain Echo cancellation in data transmission over telephone channels. **(10 Marks)**

b. Explain the use of adaptive channel equalization in digital communication system. **(10 Marks)**

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