8/5/2013 M.E(EXTC) Sem I(O)

Statistical Theory of Comm.



Con. 7624–13. **BB–6562**

(3 Hours) **[ Total Marks : 100**

**N.B.** (1) Question No.1 is **compulsory.**
(2) Answer any **four** out of the remaining **six** questions.
(3) Assume any suitable **data** whenever **necessary** but justify the same.

1. Explain the following terms with suitable examples in Communication Engineering – **20**
   (a) Moment generating functions
   (b) Memory less distribution
   (c) Ergodic process
   (d) Power spectrum
   (e) Random signal.

2. (a) Define probability measure and sample space. What are the conditions required for probability measure ? Prove – **10**

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

   (b) X and Y are the random variables each having Gaussian distribution with mean $m_x$ and $m_y$ and variance $\sigma_x^2$ and $\sigma_y^2$ respectively. What is the distribution of $Z = X + Y$ ? **10**
   Derive mean and variance of Z.

3. (a) In a class of 50 students, 26 failed in Mathematics. A football team of 11 players is selected from the class. Find the probability distribution of failed candidates in the team and average number of failed students in the team. **12**
   (b) State and prove Schwartz inequality for two real random variables. **8**

4. (a) Define a continuous random variable signal and its covariance function. What is the condition on covariance function of a stationary random signal ? **8**
   (b) Define the joint probability density and conditional probability density function of two random variables. The joint probability density function of two random variables X and Y is given by :– **12**

$$P(X, Y) = A \exp(|X| - |Y|) \quad -\infty < X, Y < \infty$$

Where A is a constant,
Find the value of A.

5. (a) Show that the optimum Wiener filter transfer function is given by — **10**

$$|H(w)|^2 = \frac{\phi_{xx(w)}}{\phi_{xx(w)} + \phi_{xx(w)}}$$

Where $\phi_{xx}(w)$ and $\phi_{nn}(w)$ are the power density spectrum of input X(t) and additive noise n(t) respectively.

(b) If Y(t) be the output of a linear time invariant system with impulse response h(t). When wide sense stationary process X(t) is applied as input, then show that $S_{XY}(w) = H(w)\, S_{XX}(w)$. **10**

6. (a) A queue is formed with the arrival rate of $\alpha$ persons per unit time and $\beta$ persons per unit time as leaving rate. What is the probability of n persons in the queue at time t ? **10**

(b) A signal is given by $X(t) = A \cos(wt + \theta)$ where A and w are constant and $\theta$ is uniformly distributed over $(0, \pi)$. Show that the signal is not WSS. If A was not to be a random variable what should be the condition on A such that signal is WSS ? **10**

7. Write short notes on :– **20**

(a) Poisson process

(b) Markov signal

(c) Bay's theorem

(d) White noise in strict sense.

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13/05/13

M.E (TTC-I 019
Comm. N/W

VT-F.H.Exam. April(1)-13-146

**Con. 7658–13.** **BB–6574**

( 3 Hours ) **[ Total Marks : 100**

**N.B. :** (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of **remaining** questions.

1. (a) Explain the role of Physical Layer in ATM network. **5**
(b) Discuss the role of Presentation Layer in OSI model. **5**
(c) Explain the Flow Control at transport layer in an IP network. **5**
(d) Explain Packet Switching in brief. **5**

2. (a) What are Queueing models ? Explain the Little's theorem with an example. **10**
(b) Draw OSI layered architecture and explain the function of each layer. **10**

3. (a) Describe the key factors in communication network evolution and explain the various approaches to network design. **10**
(b) Explain in detail M/M/1 queueing model. **10**

4. Explain the following protocols with their header format :– **20**
(a) UDP
(b) IPv4
(c) TCP
(d) IPv6.

5. (a) Explain classful addressing with subnetting. **10**
(b) Explain the function of ATM adaptation layers. Explain in detail the AAL1 and AAL2 layers. **10**

6. (a) Explain the Integrated services model in the Internet. **10**
(b) Explain the different QOS parameters in case of ATM. **10**

7. Write short notes on any **two** of the following :– **20**
(a) Open Shortest Path First (OSPF) Protocol
(b) Mobile IP and DHCP
(c) ATM Traffic Management.

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ME - SEM I (EXTC) (Old) May 2015
M.E.C.
2015|13

VT-F.H.Exam. May-13-17

**Con. 8995–13.** **BB–6583**

( 3 Hours ) **[ Total Marks : 100**

**N.B.** : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.

1. (a) Describe the key processing techniques used in making HMICs. **10**
(b) What are planar Microstriplines ? Sketch them along with their field distributions. Prove that open Microstripline supports a Non -TEM propagation. **10**

2. (a) Give the basic principle, construction and functioning of a pin diode. **10**
(b) Derive the dispersion relation for an open microstripline. **10**

3. (a) Describe in detail the doping techniques used in making MMICs. **10**
(b) What are Green's functions ? Where are they used ? **10**

4. (a) Describe the various configurations of Monolithic capacitors. **10**
(b) Discuss the effect of stripline thickness in CPW characteristics. **10**

5. (a) Describe the operation characteristics of IMPATT diode. **10**
(b) Explain the concept of narrowband coupled line filters. **10**

6. (a) Explain important consideration in slot line design. How are slot lines realized ? **10**
(b) Explain the operation of Ga As FET. **10**

7. Write notes on (any **two**) :– **20**
(a) Methods of quasistatic analysis of Microstriplines.
(b) Ion implantation techniques.
(c) Grounding problems in MIC.

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ME (extc) I old 24|5|13
Error correction codes.

**Con. 8971–13.** **BB–6589**

(3 Hours) **[ Total Marks : 100**

**N.B.** (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable **data** wherever **required.**
(4) **Figures** to the **right** indicates marks.

1. (a) Define Field, Galois Field, Ring, Vector space and order of Galois Field. **20**
(b) Explain ECC and FEC.
(c) Determine whether each of the following is primitive in GF(2) $x^3 + x^2 + 1$ and $x^5 + x^2 + 1$
(d) Describe perfect and quasi perfect code.

2. Let the polynomial $g(x) = x^{10} + x^8 + x^5 + x^4 + x^2 + x + 1$ be the generator polynomial of the cyclic code over GF(2) with block length 15 find - **20**
(i) Generator and parity check matrix.
(ii) How many errors can this code detect and correct ?
(iii) What is the minimum distance ?
(iv) Design encoder and decoder.

3. Show that every BCH code is a subfield subcode of R - S code of an same designed distance. Under what condition is the rate of the subfield subcode the same as the rate of R - S code. **20**

4. For a (7·3) two bit error correcting R - S code find the correct code word using Berlekamp Massey algorithm if the received vector is given by **20**
$r(x) = 1 + \alpha^2 x + \alpha^4 x^2 + x^3 + \alpha^6 x^4 + \alpha^3 x^5 + \alpha^5 x^6$

5. (a) What are the different techniques of decoding convolution codes ? Explain any one. **10**
(b) Devise Chien's searching ckt. for double error correcting (15, 7) BCH code. **10**

6. (a) A rate 1/2 encoder with generator sequence $G_1(D) = 1 + D + D^2$ and $G_2(D) = 1 + D^2$ is used for error control over BSC with P = 0.1. Use Fano decoding algorithm for received code vector R = 01 10 11 00 00 00. **20**

7. Write notes on (any **two**) :– **20**
(a) Stack algorithm
(b) Reed soloman code
(c) Mc-Williams identity
(d) Goppa Code.

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M.E (EXTC) SEM I (Old)
Sub:- Fiber optic communication
Date:- 30/05/2013

AGJ 1st half (n)con-code 810

**Con. 9599-13.** **BB–6601**

(3 Hours) **[ Total Marks : 100**

**N.B.** :(1) Question No. **1** is **compulsory**.
(2) Answer any **four** questions out of remaining **six** questions.

1. (a) Draw and explain the block diagram of optical fiber communication system.
(b) Explain Link Power budget for an optical link.
(c) Explain propagation of light gate through the Planar and Circular waveguides.
(d) Explain the concept Electrical Band width versus Optical Bandwidth with necessary equations. **20**

2.(a) Derive the expressions for Transmission loss factor(transmissivity) and Rayleigh scattering coefficient of an optical fiber. **10**

b) Explain the various losses in optical fiber. **10**

3. (a) Define modal birefringence in optical fiber. Explain the various factors responsible for the same with its dependence on polarization of light. **10**
(b) Explain in detail any one fabrication process of optical fiber with a neat diagram. **10**

4.(a) What are requirements of that are to be satisfied by optical sources to suit for Optical fiber communication. What is direct and indirect materials ,explain why direct bandgap materials are used in case of LEDs. **10**
(b) Draw and explain surface emitter double heterodyne LED structure. **10**

5. a)Explain the basic principle of LASER generation. Discuss any two types of solid state LASERs. **10**

b) Draw and explain block diagram of Optical amplifier. **10**

6. (a) Explain various modulation techniques along with WDM and TDM. **10**
(b) Explain the polarization of mode in SIF. **10**

7. Write short notes on any four :- **20**
(a) Numerical aperture and total number of modes in optical fiber.
(b) Optical receiver and noise sources.
(c) APD and RAPD.
(d) Rise Time Budget.
(e) Waveguide equation for SIF.