ME (EXTC) - I 22/11/2012-

STOC old

98 : 2nd half-12-(e) JP

Con. 7491-12.

BB–4295

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

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

1. Define the following terms with suitable examples in Communication Engineering :— **20**
   (a) Random signal
   (b) Wiener process
   (c) Queucing theory
   (d) Ergodic process.

2. (a) Define sample space and probability. State the conditions required for probability measure. Prove $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. **10**
   (b) State and prove Schwartz inequality for two real random variables. **10**

3. (a) State and prove Bay's theorem of conditional probability of an event A that can occur through n mutually exclusive channels $C_1, C_2, C_3 \ldots . C_n$. **10**
   (b) Two dice are rolled. One of them is a fair die, while the other die is an unfair die and shows only 3, 4, 5 or 6 with equal probability. Find the probability distribution for sum of their face values. **10**

4. (a) What is moment generating functions for probability distribution function ? Show that all the moments can be generated from the moment generating function. **10**
   (b) If $H(w) = \dfrac{w^2 + 16}{(w^2 + 9)(w^2 + 25)}$ **10**
   Find realizable transfer function and evaluate impulse response h(t).

5. (a) If X and Y are independent random variables with identical uniform distribution in (0, 1) and $U = X + Y$, $V = X - Y$ **10**
   Find : (i) Joint density function of (U, V)
   (ii) Density function of U
   (iii) Density function of V.
   (b) If Y(t) be the output of linear time invariant system with impulse response h(t). When wide sense stationary random process X(t) is applied as an input, then show that $S_{XY}(w) = H(w), S_{XX}(w)$. **10**

6. (a) The probability of a cell originating in a telephone exchange in an infinitesimal interval dt is $\lambda(t)$ dt. Find the probability distribution of N calls orginating from the exchange in a time interval (O, T). Find mean and variance of N. **10**
   (b) A particle is undergoing one dimensional random walk taking a step + a with probability p and –a with probability q = 1–p. Find the probability for : **10**
   (i) return to origin after 2N steps (ii) first return to origin after 2N steps.

7. Write short notes explaining the basic concepts :— **20**
   (a) Classical Brownian Motion
   (b) Mar kov Signal
   (c) Memoriless Distribution
   (d) Poisson Process.

ME/EXTC/I (OLD) 27/11/12
Communication Networks

AGJ–2nd half (k)–12–49

Con. 9484–12.

BB-7923

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) **All** questions carry **equal** marks. **Figures** to **right** indicate marks.
(3) Assume any **four** from remaining **six** questions.
(4) Draw **neat** diagrams wherever **necessary**.

1 a) Derive Little's Formula. (05)
b) Explain the working of Huffman Coding for Lossless data compression. (05)
c) Explain RSA with an example. (05)
d) Mention various QoS parameters of ATM. (05)

2 a) Derive an expression for basic multiplexer Queueing model M/M/1. (10)
b) Explain the key factors involved in communication network evolution. (10)

3 a) Explain in detail the working of MPLS. (10)
b) Explain with an example the process of Key distribution & Key-Exchange using cryptographic techniques. (10)

4a) Explain in detail about ATM and its Broadband ISDN reference model. (10)
b) Explain the working of OSI reference model & compare with TCP/IP protocol suite. (10)

5 a) Draw and explain the header format of IPv4 .Compare IPv4 and IPv6. (10)
b) Explain in detail the compression of video motion compensation with the support of MPEG standards. (10)

6 a) Explain in detail the working of IPSec with AH & ESP. (10)
b) Explain in brief about functioning of ATM Adaptation layers (AAL).Write about AAL2 in detail. (10)

7 . Write short notes on any **four** from following : (20)
a) TCP header format
b) RSVP – Reservation Protocol
c) Data Encryption standard (DES)
d) JPEG- Joint Pictures Experts Group
e) Real Time Protocol - (RTP)

M.E. Extc Sem Old NID-2012

Sub-MIC 03/12/12

5 : 2nd half-12-(k) JP

Con. 9927-12. **BB–8538**

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

N.B.: (1) Question No.**1** is **compulsory**.
(2) Solve any **four** from remaining **six** questions.

1. (a) State and explain various losses in microstrip lines. **10**
   (b) What are Coupled Microstrip lines, derive their wave equations. **10**

2. (a) Describe the key processing techniques in MMIC. **10**
   (b) What do you mean by quasistatic analysis ? How is it different from full wave analysis ? **10**
   Describe one method of quasistatic analysis for microstrip lines.

3. (a) Discuss the effect of stripline thickness on CPW characteristics. **10**
   (b) State and explain important considerations in slot line design. How are the slot lines realized ? **10**

4. (a) A micro strip is to be designed on alumina substrate having a relative dielectric constant **10**
   $\epsilon_r = 9{\cdot}1$ and substrate height h = 1·51 mm. Compute the following :—
   (i) width for a 75Ω transmission line
   (ii) Effective dielectric constant
   (iii) The phase velocity
   (iv) The guide wavelength
   The frequency of operation in 6 GHz.
   (b) State and explain Green functions. Explain its importance. **10**

5. (a) Explain varactor diode and its applications. **10**
   (b) Explain the operation of PIN DIODES. **10**

6. (a) Derive the dispersion relation for an open microstrip line. **10**
   (b) Compare the characteristics of microstrip lines, slot line and coplanar wave guide **10**
   and describe distinguishing features of slot line and coplanar wave guide.

7. Write notes (any **two**) :— **20**
   (a) Ion implantation
   (b) Dielectric Resonator
   (c) Grounding problems in MIC.

ME | EXTC- | I (Old) 8|12|12
Error correction Codes.

6 : 2nd half.12-AM(g)

Con. 7456-12. **BB-4328**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** from remaining **six** questions.
(3) Assume suitable **data** wherever **required**.
(4) **Figures** to the **right** indicate **marks**.

1. (a) Show the polynomial and exponential representation of elements in GF(16) and GF(9). **20**
   (b) State different decoding Techniques for convolution code. Write the steps of any one Technique.
   (c) Consider prime field of GF(11) construct addition and multiplication table.
   (d) State different types of error correcting and explain. Write its application also.

2. For a (15, 11) cyclic hamming code generated by $9(x) = 1 + x + x^4$ determine — **20**
   (a) Generator polynomial of its dual code.
   (b) Construct G and H matrics in systematic form.
   (c) Draw encoder-decoder diagram.
   (d) Find codeword if m = 10101100001.

3. Given 8 * 4 systematic code where parity check equations are **20**

$$v_0 = u_0 + u_1 + u_2$$
$$v_1 = u_0 + u_1 + u_3$$
$$v_2 = u_1 + u_2 + u_3$$
$$v_3 = u_0 + u_2 + u_3$$

   Find : (i) G and code vector.
   (ii) H matrix.
   (iii) dmin. and error correcting and detecting capacity.
   (iv) Draw encoder and syndrome circuit.

4. (a) Consider the second order RM code for M = 3 determine **10**
   (i) Parameters of this RM code.
   (ii) Basis vectors of G for this code.
   (iii) Devise encoder for this RM code.
   (b) A (15, 8) code is dual of (15, 7) BCH code **10**
   Find : (i) Weight distribution of (15, 8) dual code.
   (ii) Weight enumerator of (15, 8) dual code.

[TURN OVER

5. Let 6(x) be the error Locator polynomial for the (15, 7) BCH code, SUPPOSE that $r(x) = x^6 + x^{13}$ is received when $c(x) = 0$ is transmitted. **20**
Find : (i) 6(x) with Peterson algorithm
(ii) 6(x) with Berlekemp algorithm
(iii) error Location No.

6. A rate 1/2 code with sequence
$G_1(D) = 1 + D^2 + D^3$ and **20**
$G_2(D) = 1 + D + D^3$ is used for error control on Bsc with cross over probability $P = 0{\cdot}2$ and $1 - P = 0{\cdot}8$, Draw —
(i) encoder
(ii) state diagram
(iii) Tree diagram
(iv) Apply stack algorithm to decode the received code r = 111110000111.

7. Write notes on the following :— **20**
(a) Hamming code
(b) RS code
(c) Goppa code
(d) Binary Golay Code.

M.E. EXTC Sem I old 13 Dec - 2012

Sub:- FOC

ws-Con-2012

Con. 10537–12. **BB–8754**

(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) State the difference between coherent and non-coherent sources? **20**
(b) Explain the non linear effects in optical communication.
(c) Explain the process of propagation optical signal through the fiber. Derive equations for numerical aperture total mode entering the fiber.
(d) Draw and explain the block diagram of optical fiber communication system.

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

3.(a) Draw and explain the structure of Avalanche Photo Diode (APD) along with electrical field profile that exist in the various regions of APD structure. Explain why it is also called reach through APD (RAPD). **10**
(b) Explain the various factors responsible for optical signal attenuation and dispersion while propagating through optical fiber. **10**

4.(a)What is the difference between electrical and optical bandwidth. Show the difference with the necessary derivations. Draw and explain Edge emitter double heterodyne LED structure. **10**
(b) Explain the process of Rise time budget with suitable example. **10**

5. a) Explain the techniques for measurement of attenuation, dispersion, refractive index and numerical aperture of a fiber. **10**
b) Draw and explain block diagram of optical receiver with various noise sources and the relevant equations. **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) Link power budget.
(b) Optical amplifier.
(c) Principle and structures of LASER .
(d) PIN diode.
(e)Fabrication process of Optical fiber(any one method)